THE AMERICAN GAS LIGHT JOURNAL

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, VENTILATION, WATER SUPPLY AND DISTRIBUTION, & GENERAL SCIENCE.

VOLUME XLIII.—No. 5. Whole No. 629. | NEW YORK, WEDNESDAY, SEPTEMBER 2, 1885. | $3 PER ANNUM IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager. JOS. R. THOMAS, C.E., Editor.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND CLASS MATTER.

Published on the 2d and 16th of each month, at No. 42 Pine Street, N. Y.

Terms of Subscription, Including Postage.—For the United States and Canada, $3 per annum. European countries, $3.50 (15 shillings—18 francs). All payments to be made in advance. Single copies, 15 cents.

Remittances should be made either by post-office order, registered letter, or bank draft on New York, payable to the order of A. M. Callender & Co.

Collections are invariably made directly from this office, for subscriptions, advertisements, etc. We have agents to solicit the same, but they are not authorized to receipt for money.

Correspondence.—Wishing to make this JOURNAL a gazette of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, correspondence is solicited for publication from all who make the study of those subjects a pleasure or a profession.

The American News Company, Nos. 39 and 41 Chambers street, New York, are agents for this JOURNAL. Newsdealers will send orders to them.

Books.—We will forward by express, at publisher's lowest rates, any book—scientific or otherwise—to any address in the United States or Canada. No books will be sent C. O. D.

CONTENTS.

An Asterisk (*) denotes an illustrated article.

OFFICIAL NOTICE—

Iowa Gas Association..... 113

EDITORIALS—

The "Novelties" Exhibition..... 113

A Good Specimen of the Lowe Incandescent Burner..... 114

The Chicago Gas Deal..... 114

The Market for Gas Securities..... 114

Eighth Annual Meeting of the Western Gas Association—Official Report—Concluded from page 92..... 115

Second Day, Afternoon Session—Natural Gas: Its Relation to the Gas Interest Generally, by J. M. Critchlow—Discussion—Question-Box—"Are stop-cocks and boxes, placed in service pipes, on the sidewalks necessary in towns where the daily gas output reaches 30,000 cubic feet?"—Dialogue in Answer—This and That from Europe, by Ernst Schinrock—Votes of Thanks—Adjournment of Business Sessions.

The Klonne Regenerative Furnaces at the Greenock Gas Works.... 118

Natural Gas in Plate Glass Manufacture..... 120

Coal Slag as a Building Material..... 120

Special English Correspondence..... 121

Boring for Natural Gas at Cleveland, Ohio..... 122

Technical Journalism..... 122

ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 123

An Item from Marshalltown, Iowa—The Gas Machine Man—A New Gas Company—The Fostoria (Ohio) Natural Gas Search—The Light of the Future a Thing of the Past—Street Main Mileages of Brooklyn (N. Y.) Gas Light Companies—Striking Lamplighters—The Cows were at Fault at New Orleans, La.—Ramsdell's Esthetic Taste—Personal—The "Interstate" Gas Company—Seeking Control—Cheaper Gas for Washington, Ohio—Victims to Kerosene—Suicide by Gas—Almost Completed—Natural Gas Discovered in Canada—Striving for Cheaper Gas at Green Bay, Wis.—This One not a Suicide—Killed by the Electric Current.

Patents in Belgium and Austro-Hungary..... 126

[OFFICIAL NOTICE.]

Iowa Gas Association.

BURLINGTON, IOWA, Aug. 8, 1885.

To the Fraternity of the State of Iowa:

You are hereby earnestly invited to meet together on the third Wednesday (16th) of September, next, to complete the organization of the Iowa Gas Association, to confer together upon matters of interest connected with the gas business in this State, and to promote a more intimate acquaintance and fraternal relationship than has heretofore existed among us.

The meeting will be organized at 10 o'clock A.M., at the Barret House, where provision has been made for the accommodation of all.

Please be good enough to indicate by letter, addressed to the undersigned at an early date, of the acceptance of this invitation.

R. SPENCER, President.

THE "NOVELTIES" EXHIBITION.

The manufacturers of gas apparatus in the United States have no doubt given due heed and consideration to the "Novelties" Exhibition to be held in Philadelphia, Pa., under the auspices of that sterling body of men who compose what is known as the Franklin Institute; and we might further express the belief that the attention of every gas engineer in the country has also been attracted thereto. At any rate, it is no fault of the JOURNAL should a different state of affairs exist, for timely mention of its importance has appeared in our columns. Our gas engineers have complained, and with reason, that the American public has no just conception of how much it is indebted to the craft of the gas maker for a large and increasing percentage of its home comfort. But on the other hand, and granting that the gas purveyor has greatly contributed to such a desirable result, let us ask what has been done by the fraternity towards teaching the public that it has been so benefited? We are afraid we must assert that the effort has been slight. It is no argument to say, "Where could we derive any benefits from such attempts? Instead of looking at us through friendly eyes, they regard us as their plunderers." And they will so continue to view you unless an attempt is made to remove the clouds from their optics. Try it at any rate; and if your failure continues, you will at least have the satisfaction of knowing that it was not through lack of your own energy that the failure resulted. It may occur to our readers that this curtain lecture seems rather out of place in an article referring to an exhibition; but a little reflection will show that such is not the case. Indeed it is quite pertinent to the subject, since if the gas engineers do not stir up the manufacturers of gas apparatus, the latter, or at least a number of them, may be inclined to let the Exhibition go by default. The "Novelties," as conceived by the managers of the Franklin Institute, is intended, in large part, as a means of educating the public. That it will be successful in this respect is measurably assured through a review of the success which attended the electrical exhibition of a year ago. Indeed the outcome of that display, in its effect as an educator of the public, was the real incentive that caused the Institute managers to renew their attempts through the medium of varying classes of exhibitions.

By all means let the gas men "punch up" their local manufacturers, and let the "punching up" process be repeated in case any manufacturer is obtuse enough not to see at first glance the great opportunity for advertising

his wares that will be presented by the proposed display. Many a gas engineer has perfected something or another that has been of great benefit to himself in his daily routine of work; and which, while necessarily possessing merit, in order that he could secure benefit from its use, has neither been patented, nor duplicated in the shop of any manufacturer. It is safe to claim also that such undescribed devices along with merit carry novelty. To these engineers we would say—bring out your devices and exhibit them at the "Novelties."

The doors of the Exhibition buildings will open on Tuesday, Sept. 15th, and will close on the evening of Oct. 31st; and if any intending participator has delayed his application to the "Committee on Exhibitions," let him be up and doing, for it is not too late. An entire outline of the course necessary to be pursued was given in our issue for June 16th, on pp. 316 and 317; and notice of same will also be found in our advertising columns of issues for July 2d and August 3d. It is our intention to give a detailed description of the exhibits at the "Novelties," and we hope that not a single one of our advertisers will be missing from the ranks of the exhibitors.

A GOOD SPECIMEN OF THE LOWE INCANDESCENT BURNER.

Those of our readers who are disposed to give attention to the appearance and working of the Lowe incandescent burner, and who cannot afford to spare the time involved in the making of a journey to Lynn, Massachusetts, may possibly find that the following details will relieve them from the necessity of going there at all. A close adherence to the instructions given cannot fail to result in the production of a close imitation of the Professor's "invention."

Take a piece of platinum wire (say No. 20), and carefully bend it into the shape of a horseshoe that will be about one and one-quarter inches across, and one and one-quarter inches in height. Then take another section of platinum wire (say No. 30) nine inches in length, and wind it closely around a rod having a diameter of one-eighth of an inch. Run the first loop through the helical coil, and secure the ends of loop and coil, by wire, at the top of a common burner near its tip, stretching the coil so that it will extend the entire length of the loop in even spaces. Place the loop parallel with the slot of the tip, and employ a two-feet tip. This plan will develop an almost exact reproduction of a Lowe incandescent burner.

Fill your test holder with a mixture of gas and air, allowing, say, one-half of each as the proportion, and intermix thoroughly; weight to four inches pressure; make the connection, and light the burner. The coil will speedily become incandescent, and perform lighting duty. The effect thus produced is exactly similar to that shown at Norristown, Pa., and later on at Lynn, Mass.

A mixture of gas and air identical with that in the supposed test holder mentioned above can be placed in the holders of medium sized works at a cost of 20 cents per thousand. In view of this, and with a knowledge of how to construct an excellent imitation of the burner, the superintendents of small plants would seem to be in a position where they can arrive at correct conclusions regarding the real value of the Pennsylvania Professor's latest "boon" to the gas industry of America. When the deductions are drawn it will be time enough to consult with the Professor in regard to the payment of royalties or the purchase of patent rights, etc.

THE CHICAGO GAS DEAL.

In the last issue of the JOURNAL it was stated that the Chicago City Council had granted a certain set of speculators, supposed to be working in the interests of the capitalists who control the fortunes of the Equitable Gas Light Company in New York City, a charter for the construction and operation of an opposition gas works in the Lake City. We also ventured the opinion, taking a fair survey of the state of gas matters in the aforesaid city, that it would be hard to figure out where the sagacity of the promoters made itself apparent. Later news shows that the newcomers propose to operate in the territory hitherto occupied by Mr. Billings, and known as the West Side. It appears that a prior ordinance had been passed by the Council, and the Mayor had allowed the same to become a law through lapse of time, instead of pursuing the usual course of affixing his signature thereto. Here follow the latest developments; and, giving as our authority the columns of the Chicago *Tribune*, date of Aug. 14, we herewith reproduce that newspaper's account of the same, which, we are informed, is substantially correct:

"All at once it turned out that the new ordinance was waste paper, as it was not drawn up in legal form, the enacting clause having been omitted. This technical but fatal defect had been made known to Mr. A. M. Billings, of the West Side Company, who complacently let the Aldermen have the trouble of passing the ordinance without lifting a finger to oppose it. He took good care, however, to have the fact that the ordinance was no ordinance at all become well known in New York; and Mr. McGurren and his friends were about to conclude that they had worked in vain when it occurred to one of the leaders that it would be an easy thing to secure the passage of a perfect ordinance. The New York men were told it could be done, and were even furnished with a list of the Aldermen who would vote for it; and a contract was then and there entered into that they would pay $85,000 for a 'controlling interest in the franchise within 24 hours after it had acquired legal force, provided the franchise was not "tinkered."' The big four and the other combination went to work, and all went merry as a wedding-bell. An order was introduced to rescind the first franchise, and at the same time there was introduced a new one—this time in favor of the Equitable Gas Light Company of Chicago, under which name Everhart, Lomax, and Clare had taken steps to be incorporated. Two weeks ago last Monday the new ordinance was reported back to the Council, and was ordered, deferred, and published. This brought Mr. Billings to his feet. In the short speeches made on the ordinance in the Council it was plainly indicated that the new company meant to 'work' the West Side principally. Besides, it is more than likely that some of the Aldermen who do 'business' on their own account, and become members of either section of the 'ring' only for a 'job,' found it convenient to talk about the matter with Mr. Billings. The latter was anxious to prevent the passage of the ordinance, and a scheme was really concocted to have it die. Thursday evening, after the ordinance was introduced the Council met in adjourned session. In some mysterious way the gas ordinance was on the top instead of at the bottom of the pile of unfinished business, and the Clerk began to read it. But an Alderman objected to its being considered, as it had been deferred to the next regular meeting. No fuss was made at the time, and the managers went to work with a will to keep their men together. The next Monday the ordinance passed during the closing minutes of the session. Then Mr. Billings began to work, but found it was too late. He investigated matters in New York as well as here, and ascertained that the Aldermen were committed to the New York men, and that the latter had the power to make things very uncomfortable for certain parties if they were deceived; nor did he think he could outbid the new company; and as a last resort he gave to the Mayor all the points which the latter used in his message vetoing the ordinance. The managers in the Council were informed in good season of the Mayor's intention to veto the ordinance, and three Aldermen went to remonstrate with him. He told them he thought he ought not to approve of the ordinance, although he believed it would be passed in any event. The managers sent the word all along the line, and last Monday evening they had all the votes needed on hand. One member had intended to take a drive with a lady friend; but he was taken in charge by two colleagues, who spoiled his drive and kept him in his seat until the ordinance was passed over the Mayor's veto. Another was sick and hardly able to sit up, but he had to be present to maintain his 'rights.' The ordinance did pass, and before 24 hours had gone by the franchise had been transferred to the control of New York capitalists, and $85,000 of the latter's money was paid out to the lucky fellows whom the Aldermen had presented with a fortune. It would be against all precedent if they were to prove forgetful of the 'kindness' shown them, especially as they would never have dreamed of becoming directors in a gas company but for the 'generous impulses' of certain Aldermen."

All of which furnishes interesting reading, despite the fact that it reveals a goodly share of "crookedness." The "New York men" may count on a lively reception at the hands of Mr. Billings when the actual struggle begins; and "as it is with the Consumers Company so may it be with the Equitable." We understand it is the intention of the "New York men" to capitalize the results of their purchase on the basis of three million dollars of stock, and two million dollars of six per cent. bonds, and that a certain Mr. W. Brenton Welling, with headquarters at No. 18 Wall street, this city, is engaged in an attempt to permit intending investors to effect an entrance on the "ground floor."

The Market for Gas Securities.

Dullness continues to be the prominent feature in the market for city gas shares, although Consolidated stock rather unaccountably developed surprising weakness on the light trading for the fortnight. At time of writing (noon, Aug. 31), the bid price is 92, holders demanding 93. As before stated this decline is unexplainable, as the corporation, on its average output during interim of last dividend is earning at the rate of eight per cent. or more on its capital. We know it to be a fact that those high in authority in the management of the company advise investment in Consolidated shares. Equitable, of New York, is at same prices as those previously quoted; Mutual is steady to strong. Brooklyn shares preserve their tone, but transfers are few and far between. We note that Baltimore Consolidated has declared, and will pay on Sept. 15th, a dividend of 1½ per cent. This has had the effect of adding 5 points to the value of the shares.

For regular list of quotations, see page 126.

[Official Report—Concluded from page 92.]

Eighth Annual Meeting of the Western Gas Association.

Held at the Tremont House, Chicago, Ills., May 13, 14, and 15, 1885.

Second Day—Afternoon Session.

On motion of Mr. Printz, the thanks of the Association were extended to Mr. McMillin for his paper on "Natural Gas," after which the Chairman suggested that (as Mr. J. M. Critchlow, of Beaver Falls, Pa., had presented a paper on the subject treated of by Mr. McMillin) the second communication be read before the discussion be proceeded with. This was agreed to. Mr. Critchlow's paper had the heading of—

NATURAL GAS: ITS RELATION TO THE GAS INTEREST GENERALLY,

and is as follows:

Gentlemen:—A person situated as I am, with the roaring and hissing of the burning natural gas constantly ringing in his ears, as it blows through a six-inch safety valve, at a pressure of 60 pounds per square inch, even after having traveled over a distance of some eleven miles, up hill and down dale, crossing both the Ohio and Beaver rivers, and along its line having supplied the exclusive fuel for several thousand fires, burning not alone in dwellings, but also in glass works, brick kilns, potteries, steel and wire mills, etc., etc., would naturally be more or less inspired by his subject. Natural gas, as found in New York, Pennsylvania, and West Virginia, varies somewhat in specific gravity, chemical composition and illuminating power.

The incorrect idea is prevalent that the specific gravity of natural gas is much greater than that of coal gas, or even of air. Haswell gives carburetted hydrogen at 0.559, and coal gas from 0.438 to 0.752; whereas tests made by Professors Wurtz, Sadtler, Fouqué, and others, on samples of gases from eight of the largest and the best wells within the territory referred to, give the specific gravity from 0.45, at a well in Warren County, Pa., to 0.693 at West Bloomfield, N. Y. The famous Murraysville wells, which supply a large part of Pittsburgh, Pa., are given between the extremes at 0.56. In fact there are only one or two records given that show instances of greater gravity. The one I have been able to find refers to a well in Venango County, Pa., where the figure is put at 1.51.

In comparing analyses of 12 "roarers," marsh gas, (CH_4) predominates in all, varying from 60.27 to 96.50 per cent. Carbonic acid is almost invariably present, but generally in small quantities, or from 0.34 to 3.64 per cent. This latter assertion I may qualify somewhat by instancing two notable exceptions. One of these is in West Virginia, where 15.86 per cent. is developed; the other, or second, is afforded by a New York State well, where over 10 per cent. of carbonic acid is found in the gas. Carbonic oxide is barely traceable. Oxygen, hydrogen, and nitrogen, are not always present; but either each or all occasionally appear. The proportion of oxygen varies from 0.23 to 2.20 per cent.; hydrogen from 4.79 to 22.50 per cent.; and nitrogen from 4.31 to 7.32 per cent. No trace of sulphur is on record in the territory referred to.

The illuminating power of natural gas, when consumed through an ordinary open tip, is about one-half that afforded by coal gas. This assertion is variable, however, as to location—the illuminating value improving as the well line from West Virginia to northern New York is followed. Newspapers have, from time to time, teemed with discussion as to whether or not natural gas possesses an odor. As a rule, it undoubtedly does. The smell may easily be mistaken for that coming from the vapors of naphtha.

Carefully-conducted experiments have shown the calorific value of natural gas to be greater, foot for foot, under the same pressure, than hydrogen, carbonic oxide, or water gas; and also less than that of coal gas.

In its relations to the gas interest generally, I take it that it is, or will be, advantageous in several directions. It is doing us much good by educating the public up to the fact that the fuel of the future, and the solution of the smoke nuisance, is gas—natural or manufactured. For instance, Pennsylvania alone now contains almost 200 chartered natural gas companies, representing a combined capital of $2,500,000. The consumers of the product of these companies pay from 2 cents to 20 cents per thousand cubic feet; but are, with rare exceptions, so well pleased that they would pay double, and, in many cases, three or four times as much rather than go back to the use of coal. The influence of this feeling is carried in all directions; and will result in our established gas plants devising means and ways to supply gaseous fuel at profitable prices. Coal gas plants have no need to be discouraged even now in this respect. It takes 293 feet of hydrogen, or 313 feet of carbonic oxide, to accomplish that which 94 feet of natural gas, or about 70 feet of coal gas will perform. By this showing, 1,000 feet of coal gas, at about $1.07 per 1,000, is as cheap to the fuel consumer as the same amount of water fuel gas at 25 cents. In reference to the utility of natural gas for illuminating purposes, I am able to say that it is at the present time a success as converted and enriched at the Beaver Falls, Pa., gas works. We had been making 22-candle "Lowe" gas for three years. We have been using natural gas entirely (with the added naphtha enricher) since February 2, 1885, with the greatest satisfaction to ourselves and consumers.

The only change made necessary away from the works was the altering of the 6-feet water gas tips to threes and fours—in fact the same tips that gave satisfaction with coal gas do so now under our present mode of manufacture.

The most interesting feature of this subject to our company is the economy and healthfulness of the new plan. We pay 10 cents per thousand for the crude natural gas, and then effect a saving of 20 cents per 1,000 over the cost of gas as manufactured under the so-called water process.

Heretofore we could not tap a main with the pressure on without laying up one or two men from headache; now, one man can take his time and tap a 1¼-inch hole under three inches pressure, if need be, with no inconvenience whatever.

Discussion.

Prof. S. H. Douglas—I have had much to do with natural gas all my life. Reference is made in Mr. McMillin's paper to my native town. I was there when the gas well alluded to was first opened up; and when I left that town it was still lighted by the gas obtained from a well sunk in the bituminous shale. I think I have some views which perhaps may be of value to gas men as to the durability of these Ohio wells. I have but little confidence in their stability. I think the gas there is generated in small fields, and that the reservoirs extend only over small districts. I incline to the view that it is only a question of a few months, or years at most, when every one of the wells will fail. On the other hand, with reference to the Fredonia wells, I will say that they have been in duty, I should think, in the neighborhood of fifty years. I can barely recollect the time when they were first discovered. Gas has flowed from them in limited quantities—at times the flow almost disappeared. Various wells were sunk which would flow for a short time and then die out. As an illustration of the unevenness of the flow I may state that a friend of mine once made a contract with the Government for lighting the lighthouses at Dunkirk and at Cortlandt. He proposed to light them with natural gas. The gas was laid on to the lighthouse structures, but in a few months the supply failed completely, and the leaden conduits were removed. I remember very well it was a common thing for the boys at the time to uncover the pipe (it was near the surface) with the object of securing lead for making bullets. The experiment in lighting with natural gas was a perfect failure. Then, again, at a Fredonia hotel, the owner of which while sinking a well struck the gas, and thought he could turn it to account in the lighting of his building. A holder was erected, and the gas was conveyed to the hotel; in a few days the supply failed. Taking it all in all (notwithstanding Mr. McMillin seems to have somewhat different information), up to the present time natural gas wells have been short lived. They are not to be relied upon for any length of time. I am familiar with the operations of the gas plant that supplies Fredonia. This plant was partially supplied with gas from the wells. It was designed, when the works were constructed, that they should derive the entire revenue from this source; but the owners soon found that these wells would not give off enough gas to supply the needs of the town. The plant was pieced out by the construction of a coal gas works to act in connection with the natural gas. This should give proof that the flow of natural gas is unreliable. I think the Fredonia experience, where experiments in connection with this subject have been made for over fifty years, will apply to all the natural gas districts of the country. Then, again, as to the manner in which the gas is generated—whether it is of animal or vegetable origin. I may claim that this question is far from being settled. My own impression is that the vegetable theorists have the better of the argument. Its origin and that of coal oils may be traced to the same source.

Mr. McMillin—I do not think the coal oils are purely vegetable oils.

Prof. Douglas—They are somewhat mixed, perhaps.

Mr. L. K. Scofield—What are the ordinary features of gas wells?

Mr. McMillin—It depends upon what strata they start from. They have to get down to a certain geological horizon; and that may be reached at a depth of 4,000 feet, or it may be encountered at 300 feet. It depends upon how much material rises above the geological horizon where the gas is generated.

Mr. Scofield—Considerable interest in the development of or search for gas wells has recently been manifested in the State of Kansas. At our city of Fort Scott, some 12 or 15 year ago a gas well was struck, and it is flowing now. The output is limited in quantity. When the gas vein was first tapped it was encountered by miners sinking for coal—at least so the story goes—who had reached a depth of 270 feet. It is said that the initial flow was very large, and its strength continued for a year or two. The managers of the gas company, who had at about that time constructed their works, obtained control of the well and plugged it up, with the object of doing away with possible competition. The well is filled with water, but there is a flow of gas through it that is conducted out through a pipe, and the supply is sufficient to operate four or five burners consuming six feet per hour.

It is more than 300 feet in depth. Judging from this well, many have thought that a large gas reservoir existed beneath the soil of our locality; and finally this belief grew so strong that last fall some hardy spirits organized a company for the purpose of developing the home natural gas industry. They went down 625 feet, but did not strike gas. They did uncover a well of mineral water, and are not yet discouraged, since they propose to "sink" again in their efforts to demolish the "gas monopoly."

Prof. Douglas—My impression is that the stock in neither company will ever be very valuable. Natural gas, as we know in many cases, is of vegetable origin. I have in mind a case near Detroit, Mich., where a Frenchman dug a well through a deposit of peaty or vegetable matter. He got down about two feet with the well-hole, when he struck a gas vein. The gas came pouring out in large quantities, and he jumped out of that hole as quick as was possible. In some way or another the gas became ignited and exploded, and then burned fiercely in the well bottom. He became greatly frightened, and, in his alarm, filled up the well in great haste. The Rev. Dr. Duffy, who had a great taste for natural science, heard of this circumstance, and visited the place for the purpose of finding out all about the occurrence—the strength of the flow, likelihood of durability, etc. He saw the Frenchman and tried to prevail upon him to have the well, reopened; but that individual said, "No; because he knew the well led to the infernal regions." Nothing would induce him either to explore it himself or to consent to its being explored. That was the last of that well. Another well was opened in the district some three or four years ago. At first a great flow of gas was obtained, and a company was organized for the purpose of conveying the output to the city of Detroit, where it was proposed to use the natural gas in the lighting of that city. The supply speedily gave out, and so ended the project. I think, to a certain extent, that will be the case with every one of the Pennsylvania wells, and natural gas wells generally. They will flow for a time and then cease. They are not durable. As to natural gas affecting gas stocks—or gas consumption—that is out of the question entirely. No such result can happen.

Mr. McMillin—It is in regard to the question of the origin of gases that I differ with Prof. Douglas. I would heartily enjoy a discussion on that subject with him; yet, while that is the main point of difference between us, I also make bold to say, should we conceive the idea that we are not likely to meet with any competition from natural gas, we would be deceiving ourselves. In the Pittsburgh region, during each 24 hours, the natural gas wells supply over ten times the quantity of gas that is sent out from the works of the companies sending representatives to this meeting of the Western Association. Owners of huge factories in the Pittsburgh district have expended large sums of money in fitting or adapting their plants to the use of natural gas; and, being business men, and clever ones too, I think I am justified in making the claim they would not make these great outlays unless they were measurably certain that the new fuel sources were permanent. The company I have named in my paper has been using natural gas for ten years.

Prof. Douglas—Still, all the statistics tend to show that the gas supply is not permanent.

Mr. McMillin—I do not concede that, speaking for the primal supply. When the flow from one well-hole fails a new supply is secured by sinking a new hole. Let me call attention to another fact—many of the wells that had ceased flowing, or whose flow had become feeble, upon being cleaned out, were revivified or renewed. How do we know but that such may or should be the history of all of them? They may have been clogged up by paraffine accumulations. At Pittsburgh some 50 or 60 millions cubic feet of natural gas is sold every 24 hours; and I should judge that a much larger quantity than that consumed is wasted every day. In the section or territory where the wells are driven the country, for miles around, is illuminated by huge torch-like fires of flame that are simply the result of the ignition of the escaping gases from unemployed wells.

Prof. Douglas—What is the history of the Erie, Pa., gas wells?

Mr. McMillin—I do not know; I did not go there; but I do know that the facts given in my paper represent the latest information that can be gathered on the subject. The Commission referred to by me was appointed by a Pittsburgh Court, and it has now been in session during a great many months. They had all sorts of "experts"—pipe layers, chemists, engineers, and mechanics—representing almost every class or profession, before them. Only a portion of the testimony gathered has been made public; but in due time a full report and history of the examination will be published. It should furnish most interesting reading. The advance which has been made, since the day or time when Prof. Douglas and his playmates were "hooking" lead pipes for the purpose of moulding them into bullets, is as great in the natural gas field as it has been in our own coal gas industry.

A Member—I paid a visit to Vandalia, Ohio, the other day, and during a conversation there with a friend we discussed the natural gas question—my friend was a resident of Vandalia. I was much surprised when he said to me that he would not have the natural gas in his house.

Mr. McMillin—I would not use the Vandalia gas either, and because that gas contains such a large proportion of sulphuretted hydrogen. They make no attempt at purifying the Vandalia gas, neither do they measure the amount consumed. They supply the gas at so much per month, and a consumer may burn all he pleases. The gas there issues, I think, at a pressure of 200 pounds. I did not see the gauge on, but my impression is that the pressure was very great. Wells have been flowing at East Liverpool, Ohio, for 20 or 25 years. There are many places where wells have been flowing constantly. There have, no doubt, been thousands and tens of thousands of failures, but the failures are attributable to the fact that the wells have not been properly located; and here comes in the importance of Prof. White's discovery. If they are not properly located they will not last long; and it is true that their life may not be great even if they are rightly placed. Short or long lived the fact remains that the money paid out for natural gas in Pittsburgh (even at the low prices at which they are selling it) amounts to a good many thousands of dollars each 24 hours.

A Member—At the town of Lima, Ohio, a bore-hole has been sunk about 1,300 feet. At 900 feet depth oil was encountered. I should like to see them get natural gas there.

Mr. McMillin—Where they get plenty of oil is not a good place to get natural gas. They are boring in the wrong place.

A Member—The Lima folks seem very much discouraged about it. They fear they will not secure much gas after striking such a plentiful oil streak. At Vandalia they did not get much oil; but they did get a good supply of gas.

Mr. McMillin—I am not well informed as to the geological formation in the neighborhood of Lima; but my impression is that you would have to go a great deal deeper to reach the horizon there than at the Vandalia and Bowling Green ridge. I think at Lima you are just in the Huron shales, and that going down through those shales you might encounter light veins of oil and gas all the way down. There is not sufficient covering over the Huron shale to make a good store-house for the gas; and that is also one reason why the wells at Fredonia, N. Y., and at Lima, Ohio, are not fit illustrations when estimating the life of a natural gas well. They have only about 300 feet on them, whereas the good wells at Pittsburgh have over 2,000 feet of covering. At Vandalia you would have to pierce the thickness of the Huron shale, and 1,500 feet in addition, thus showing that, as between Vandalia and Lima, the drills would have to sink 1,500 feet deeper at the former than at the latter place in the effort to reach the same geological horizon.

Prof. Douglas—Have you made inquiry as to the gas wells near Rochester, N. Y?

Mr. McMillin—No, I did not. At Bradford, Pa., I think they bring some of their natural gas supply over a distance of 20 miles. In that town with its small population, they sell three million feet of natural gas every twenty-four hours.

Mr. Baxter—Has the first well that was opened in that vicinity given out?

Mr. McMillin—No; it has failed a little, but is still a good well.

Mr. Baxter—It has been in operation now about 14 years. I was with the Alleghany, Pa., Company at the time they first analyzed that gas by means of special test. I was with Mr. Young and Prof. George Hall when they made the experiments, and these (as nearly as I can remember) gave evidence that the illuminating value was about 7¼ candles.

Mr. McMillin—The illuminating power of natural gas is quite surprising to me. The gas men have been in the habit of attributing all the light they get to three, four, or five per cent. of illuminants they have in their gas. At Vandalia the illuminants figure but 1¼ per cent., and yet their gas is as good as any coal gas. The gas from the wells about Pittsburgh contains but a trace of illuminants; still, it gives seven or eight candle power with the ordinary burner, and 13 or 14 with the Argand.

Mr. Smith—What is it that gives the light?

Mr. McMillin—I think it is the heating of particles of carbon in combination with hydrogen. The hydrogen burns, we know; but if only the hydrogen burns, we have always supposed that the carbon would give us some light; yet these gases that have no illuminants will develop thirteen or fourteen candles in an Argand burner. Bradford gas develops an illuminating value of about 24 candles in the Argand; but that gas comes from the great oil regions, or where the gas all comes off of the oil, and carries rich benzine vapors with it.

Mr. Eugene Printz—About eighty miles from Columbus, Ohio, there is a natural gas well that has been flowing strongly for some 25 years.

Mr. McMillin—That well has been flowing since 1814.

Mr. Printz—My memory will not go quite that far back. (Laughter.) My first remembrance of the well was when they were using the gas in the making of steam for the purpose of operating an engine to pump the water from salt wells in the neighborhood. They afterwards dispensed with the boiler, turned the gas right into the engine, and drove it at a pressure of 60 pounds to the square inch. It was conveyed to the point of use through a 2½-inch

pipe. Some gentlemen from Meadville, Pa., have purchased the farm on which the well is located, and are now preparing to supply two neighboring villages with fuel gas.

The President—I wish to say a word or two on this natural gas question. Some twelve years ago five or six of these wells were struck in the central part of the State of Illinois, and the way in which their discovery was made was this: For a great many years the water in the wells on the farms in that part of the country would disappear during a drought, and the farmers conceived the idea of sinking them deeper, in the hope of finding a more stable source of supply. During the sinking they found that at a depth of 100 feet gas was encountered. It was a very light marsh gas, and quite a number of the residents fitted up their houses for its employment as a lighting agent. It burned very nicely when allowed free vent, but gave no light of any consequence when passed through a burner tip. After four or five seasons of wet weather the water rose in the ground again and filled up all the streaks where this gas seemed to lie hidden, and the flow gave out. It reappears, though, during extremely dry seasons. It had no perceptible smell, and did not contain a trace of sulphur.

The discussion upon natural gas was here brought to a close, and the Chairman stated that the regularly contributed papers had been read and disposed of. He further announced that a member had submitted the following question:

"*Are stopcocks and boxes, placed in service pipes, on the sidewalks necessary in towns where the daily gas output reaches* 30,000 *cubic feet?*"

He hoped the members would supply the asked-for information. In reply to the intimation the following dialogue took place:

Mr. W. Clark—A year or two ago I started making gas in a new plant in a Southern city. The town had been piped and services had been put in before I assumed charge. They put in no sidewalk cocks; and the omission was a decided nuisance. When we turned on the gas we found that half the "plugs" in town had been removed; and for a time we had no control over the supply. We first tried air pressure on the mains to find out if they were leaky, but soon discovered that the trouble arose from the uncapping of house services. We sent out our workmen and had the caps replaced. In the case of a burning building we certainly want cocks and boxes. I cannot, indeed, imagine how a gas company could get along satisfactorily without them.

Mr. V. L. Elbert—At Jackson, Mich., during the last year we came to the conclusion that all services over an inch in diameter should be fitted with sidewalk boxes. The plan is desirable, provided the stopcock is fitted in a good box, well covered.

Mr. Howard—For my part, I believe that stopcocks on sidewalks are perfect nuisances. They are not reliable; they gather frost, and generally stop up the services more or less—especially in very cold climates. You may take a stopcock and set it carefully in position; but allow it to remain in place for three or four years, and I defy you to turn it. I have taken out plenty of them in our town; but in order to get them out I have had to wrench off the top of the plug before I could turn it.

A Member—Do you use iron?

Mr. Howard—No; we use brass. If you take into consideration the amount of gas you would lose in consequence of a single fire, through not being quick enough at the scene of conflagration to shut off the gas, and then consider the inconvenience from frost and the cost incurred, you will probably find that you can stand two or three fires, with their consequent loss of gas, rather than bear the expense of sidewalk stopcocks.

A Member—Where do you turn the gas off?

Mr. Howard—At the meter.

Mr. Z. T. F. Runner—At Freeport, Ills., we have laid our services, at least in the last few years, without stopcocks. Under the former practice we were troubled more or less with leakage at the cocks, and found that after being laid a few years we could not turn them. In case of fire, I could get a monkey wrench in any hardware shop and turn off the gas in one-half the time that it would take to get a key and turn it off at the stopcock on the sidewalk.

The President—For the last seven years I have never put services in without putting in stopcocks, and have never had any difficulty in shutting them off in case of fire. We put in iron boxes along with them. Some time ago, or when we used a light stopcock, we found difficulty in turning them; but since we began putting in heavy ones we have had no trouble. I would not put a service in for anybody without placing a stopcock and box. We have no trouble from freezing. Our thermometer registered 20° below zero last winter, yet we did not have any trouble from frost in the boxes.

A Member—For twenty-five years we have done without them, and do not propose to make the experiment now. It will not pay.

Mr. L. K. Scofield—At Fort Scott, Kansas, the consumers pay for stopcocks when put in. They are, it seems to me at least, of no particular benefit; and they are expensive arrangements when properly constructed.

The President—My opinion is that this question hinges solely upon the output of the works. I think they are desirable in all large cities, and should be employed in all cases where the send-out reaches 100,000 cubic feet per day. That has been my experience as the result of observation gained in the handling of thirteen different works. I have put them in even where the production was inside of 25,000 feet per day. In a city like St. Louis we could not get along without them. It is sometimes the only way in which we can secure the settlement of our accounts. The trouble with them in a great many of the smaller towns arises from the fact that oftentimes the sidewalks are made of planks; and in the change of grades the boxes get filled up with dirt and stones, so as to render it impossible to open them.

The President next announced that the Secretary had received a letter addressed to the Association from Mr. Ernst Schinrock, under date of Brussels, Belgium, April 29, 1885. It was headed

THIS AND THAT FROM EUROPE,

and the President suggested that now would be an appropriate time for its presentation. No objection was offered, and Secretary Littleton read as follows:

Mr. President, and Gentlemen of the Western Gas Association:—As I am interested in the welfare of some Western gas works, I have made it a business during my present visit to the Old World to institute some investigation into the management of European gas works, in the attempt to discover if, by introducing some of their improved methods in the carbonization of coal, and adopting their ways of selling gas, I could benefit you in the West by a recital of the experience so gained. This I may do should I succeed in proving to you that it would be profitable for you to become European imitators without asking you to experiment on your own companies' individual accounts.

The use of regenerative furnaces makes rapid progress here; and perhaps I may say the best ones—viz., the most economical in their construction and most efficient and durable in their action—are considered to be the specimens employed by Mr. Hunt at the Birmingham (England) gas works, where they charge every six hours, use through retorts 20 feet in length, and employ only from 14 to 15 per cent. of the coke for fuel purposes. These through retorts have already been introduced in Cincinnati, Ohio, by General Hickenlooper, upon the recommendation of a gentleman well qualified to know.

Belgium, the country of economy, claims also to have a very good furnace, as used in Gand and other towns. The furnace is cheap and compact, and the firebox is so constructed that only a certain amount of coke can be burned during 24 hours. Gas works that employ this system will use different quantities of coke, according to the number of charges made in one day. This furnace can be recommended to those who are considering the matter of the reconstruction of old benches, since its installation may be cheaply accomplished.

Germany has quite a number of systems of furnaces. They were the first to make them work well in practice, but they were very dear, and are still expensive. The construction has been simplified through the studies of English and Belgian gas engineers.

German gas engineers like to introduce their own designs; and this little weakness may explain the fact that there are still many old benches at most of the German gas plants. Prof. Schilling's, August Klönne's, and the Stettin specimens of furnace make but little headway among their own countrymen. The superiority of regenerative furnaces is best illustrated by the following fact: The city of Cologne built a new works in 1876. There were then constructed 40 ovens on the old and 40 furnaces on the generator style. The superiority of the latter was so marked that they replaced 60 old ovens, and therefore the 40 old ones were scarcely used at all. Since that time Mr. Hegener, one of the ablest gas engineers in the world, has improved his furnace so far that he has left over for sale (deducting the coke used for heating the retorts) 580 to 600 kilos. from each 1,000 kilos. of coal carbonized. The net cost of gas in holder at Cologne is only six cents per 1,000 cubic feet; and Mr. Hegener may be excused for saying that neither electricity, water gas, nor any other artificial illuminant can be produced at such a low figure.

As the furnace question is important to every gas manager, I may be excused for having given so much space to it in this letter. All that I will add upon the subject is to say that any gas plant, be it large or small, will find it decidedly profitable to adopt a good and approved system of regenerative firing.

In order to reduce the cost of gas, purifying is done in Germany, France, and Belgium almost entirely by the oxide of iron. As this material becomes valuable to others after becoming useless to the gas company (there is a large demand for it from manufacturers of Prussian blue), in many Continental works gas purification really brings a profit. The cost of gas is also reduced by sales of coke to consumers, who pay good prices for it. This is

only possible when the coke has been reduced to nut-coal size; the demand is then very large. As the fire is smokeless, and gives but little ash, and can be ignited by special gas burners, gas managers in America should employ crushing machinery, in order that they may receive the same benefit derived by their Continental cousins from this bye-product.

Proper care is here taken to extract all the ammonia. If this is not done repairs to gas meters become expensive, as ammonia is destructive to the membrane. The price for ammoniacal products has fallen off; but the managers of the Cologne works are now constructing plant for the manufacture of chemical products. Small works can successfully dispose of their ammoniacal liquor to gardeners and farmers. Its value in husbandry operations is well known. The disposal of tar is a difficult matter to small works; but I hope the time is not far off when, in the Western Metropolis called Chicago, factories will be established which will absorb all the tar produced at the works of the members of the Western Gas Association. Millions of dollars are now paid to European chemists by Americans for the valuable products extracted from coal tar.

A great expense to gas companies is chargeable to the construction of new gasholders. Like in the case of furnaces, an improvement has recently been introduced by a German—Prof. Intze, of Aix la Chapelle—which does away with brick basins, reduces the cost of the holder largely, allows the space under the holder to be used, makes it possible that holders can be constructed in bad ground, and also that small holders may be enlarged fourfold. The old basin can be used for storage and foundation. I expected to receive photographs of this most interesting subject, but can only send you enclosed cut, which explains itself. In Germany these holders have been adopted; and as their success has been so very great in that cautious country, it may be expected that the new plan will be introduced in England, France, and America very soon. You might ask if the size of holders of this class is limited; and I may answer, No; they are transportable up to 8,000 feet, and can be constructed (telescopic, with four lifts) to contain 8,000,000 feet.

I have now attempted to show you the plan of producing cheaply large quantities of gas, and will also briefly tell you how to dispose of the product. The celebrated pen maker, Perry, told me years ago that large returns and small profits fill the pockets. This will hold good of everything where a demand can be increased by properly pushing the sale of the article in question. The sale of gas in the United States is not pushed at all. If the managers would follow General Hickenlooper's *modus operandi*, they would soon have a large day consumption. Once America astonished the world by pushing the introduction of sewing machines into every household. Give the same energy to the sale and hiring of gas heaters and cooking apparatus, and you, managers of American gas works, will not only know the words of "Home, Sweet Home," but you will actually have been benefactors through making a home sweet, without being obliged to be satisfied with the bad cooking of an imported servant or native of the Dark Continent.

The only reason that prevents many of the young ladies of the present age from attending to kitchen duties, like their mothers and grandmothers did before them, lies in the trouble of handling coal, and its consequent dirt; but, if, by the use of gas, all home comforts can be secured cheaply, bachelors will cease to exist, clerks and others with limited incomes can establish a household, and commence living, as our forefathers did, on modest means. If this be done through the help of enterprising gas managers, "Paradise lost" will be found anew in the west of America.

There are many different ways that may be followed in increasing the use of gas cooking, heating, and lighting apparatus; but the best one will be local exhibitions. Show practical cooking done by expert ladies; in one word, all you need is the assistance of the weaker sex. Gas engines will introduce themselves; but light, fire, and house-warming by gas can only be accomplished by persistent labor. A gentleman in a speech at the town hall, on the occasion of the opening of the Carlisle, England, exhibition of gas apparatus, said they had had their stone age, their bronze age, their iron age; but now they came into the gas age. I for one will bless that day when I can see upon a visit to your Illinois towns only gas in the household.

VOTES OF THANKS.

Mr. McMillin—I move that the thanks of the Association be tendered to the retiring President, Mr. T. G. Lansden, for the very able and impartial manner in which he has presided over the Association during the past year.

Mr. Spencer—I take great pleasure in seconding that motion.

The motion was put by the Secretary and unanimously adopted by rising vote.

The Secretary—Mr. President, please consider yourself duly and heartily thanked.

The President—Gentlemen, I appreciate this kindness. It was with fear and trembling that I entered upon the duties of this office a year ago. I do assuredly appreciate the honor you have conferred upon me; and I thank you for your kind forbearance with me throughout the whole of the sessions.

Mr. Clarke—I move that the thanks of the Association be tendered to Secretary A. W. Littleton for his services.

Mr. McMillin—I take a great deal of pleasure in seconding that motion. While we have one of the best Presidents that ever presided over the Association, still I think that a great deal of the success of the meeting is due to the Secretary; and while we hope to thank him a hundred times yet to come, we should not neglect our duty on this occasion.

The President—Gentlemen, you hear the motion returning thanks to our worthy Secretary. I know that I can, for myself, truly say that if it had not been for the valuable suggestions and constant assistance rendered me by our Secretary, this meeting would not have been the success that I believe it was.

The motion was carried, and the Chairman formally notified the Secretary of the action taken. In responding Secretary Littleton said—Gentlemen, I thank you most heartily.

The following report was then read:

"The Committee appointed by the Association to offer thanks to the gentlemen and firms doing business in Chicago, who have all so generously interested themselves in our welfare and comfort during our visit to this great city, do hereby recommend that a warm and hearty vote of thanks be tendered them for their unexampled hospitality; and we, as an Association, desire to assure them that we thoroughly appreciate their kindness, and will reciprocate to the utmost of our ability.

"JAMES SOMERVILLE,
J. B. HOWARD,
Z. T. F. RUNNER, } Committee."

The resolutions were adopted; and the Chairman declared that the regular business sessions of the Eighth Annual Meeting of the Western Gas Association had terminated.

May it never falter! But of that there is no danger.

The Klonne Regenerative Furnaces at the Greenock Gas Works.

[At the recent meeting of the North British Association of Gas Managers Mr. S. Stewart, of Greenock, read the following paper on the above-named subject. A letter from Mr. W. Foulis is also appended. The matter is reprinted from the London *Journal of Gas Lighting*.]

Our first construction of the Klönne regenerative furnaces at Greenock consisted of four ovens of eight retorts each (in all, 32 retorts), each 9 feet long and 24 by 15 inches in diameter inside, the mouthpieces being contracted to 15 inches diameter. We have since constructed eight additional ovens of eight retorts each, or 64 retorts of the same size as the above, making in all 96 retorts; but of these only the first four ovens have been working, and that for about five months, when they were let out to allow of the construction of the additional ovens being proceeded with.

The producers and generators—that is, the whole furnace—stand above the level of the retort house floor. The height of the furnace to the top of the producer is about 8 feet from floor, and the combustion chamber is about 2 feet above this, or 10 feet in all. The combustion chamber stands in between the two lower retorts, the middle retorts resting upon it. The whole of the furnaces, including the producers and the regenerators, are inside the ovens, and project about 14 inches from the front of each oven, to give greater length to the producer and regenerator, and to permit of the former being more readily charged from the two middle retorts, which are drawn directly into it. With ordinary good fuel, these are found more than sufficient to keep the producer charged during the 24 hours, after it has been filled. The producer is about 3 feet wide, and has an average height of 6 feet above the furnace base, with an average length of 7 feet; and it is filled about three parts full of fuel when fully charged.

The air passing into combustion chamber travels in a zigzag manner, so as to bring it frequently in contact with the waste heat going to the chimney. The air travels in this way 12 feet; but there is exposed to the waste heat a total surface of about 100 square feet in each regenerator, of which there are two to each furnace—one on either side of the producer. The waste heat travels directly from the bottom of the lower retorts, through the middle of the regenerator, until it meets at the bottom of the furnace a horizontal flue going to the chimney; the downward travel being equal to a perpendicular distance of 8 feet on either side of the producer. The air supply to the furnace or producer, and to combustion chamber, is regulated by ventilators; and the exit of the waste heat is controlled by dampers as it joins the horizontal flue to the chimney.

In consequence of the furnaces being entirely above the retort house floor, it was necessary to construct a stage for drawing and charging the retorts. This stage is about 7 feet high from the floor to its upper surface. The coke intended for sale is drawn into barrows on the retort house floor, a space being left between the stage and the ovens to admit of the coke falling into the barrows. The coals are lifted on to the stage by a hydraulic hoist. The stages are so arranged as not to interfere with the ordinary traffic through the retort house.

The cost of the producer and regenerator, including all iron and fire brick material and labor, from the floor of the retort house to the underside of the lower side and middle retorts, was £100 per oven, or £12 10s. per retort, everything being new; and the total cost of the four ovens for the 32 retorts—including foundation, all brick and iron material, and labor in the ovens, retorts, retort mountings, hydraulic main, bench binders, charging stages, but exclusive of hoist and 15-inch main from the bench to the condenser—was £1,560, or less than £49 per mouthpiece. When, however, the extension is completed, as there will be a less proportion of heavy walls, the cost will not amount to £40 per mouthpiece.

The ovens were lighted for drying on the 15th of October last, and a gradually increasing fire was kept under the retorts until the 15th of November, when, the ovens being apparently dry (although it was afterwards found that the bench gave off steam for at least a month), the heats were increased. Two days after we commenced charging with four-hour charges, and the next day with three-hour charges (the ordinary charges of two cwt. each). This continued for a few days, when the charges were increased to 2¼ cwt., at which they were afterwards kept; being equal to 1 ton per mouthpiece per 24 hours. The retorts were regularly heated from end to end, and all very much alike. The middle retorts were, however, somewhat hotter than the others, and consequently a little more coal was put in. The clinkering only required to be done once in 24 hours; but this depends entirely upon the percentage of ash in the coke. If there was a great deal of ash the furnaces would not go for 24 hours; and if very little, we have had them in use for 48 hours without clinkering. So that by using care in selecting the fuel a good deal of labor may be saved. The amount of fuel required was found, on an average, to be 2¾ cwt. of coke per ton of cannel carbonized; while the ordinary setting generally required about 6 cwt. per ton. The workmen not being fully employed, I had the same cost for labor as in the ordinary furnaces; but when the system is fully at work, I expect to have a considerable saving under this head. As the system is not working alone (the greater proportion of gas made being from retorts fired in the ordinary way), I am unable to say at present what was the increased yield per ton of coal by the regenerative system.

I would now make a few remarks on the working of the system, as this may be of interest to those who contemplate adopting regenerative furnaces. The advantages of these furnaces are usually spoken of as embracing the following points: Saving of fuel; less accumulation of dust throughout the setting of retorts; less clinkering; lower percentage of ash and waste of coke; and saving of labor. As a consequence we have a larger quantity of coal carbonized in each retort per 24 hours, higher heats, and an increased yield per ton of coal carbonized, greater durability of the retorts and settings, and a saving of floor space in the retort house, owing to the larger number of retorts in each oven. In proceeding to refer to these points, I will take them very much in the order in which I have placed them.

First, the saving of fuel. This is generally taken at from 50 to 60 per cent. of that usually required. But a little consideration will show that this is not all due to the regenerative system in itself; for it must be borne in mind that in Scotland it is usual to put only four or five retorts in an oven, while there is no reason why seven or eight could not be set (if gas engineers would only face the expense in building larger ovens), and that these could be heated by nearly the same quantity of fuel as is used for the smaller number, if the large amount of waste heat which now passes up the chimney were properly utilized, and thus the percentage of fuel or weight of coke per ton of coal carbonized would average less in the ordinary system, especially if a stronger coke were used, as is often done with regenerative furnaces. Of course, I do not mean to say that there would be the same percentage of the fuel saved if a larger number of retorts were set in an oven in the ordinary system as with the regenerative system.

Secondly, less accumulation of dust throughout the setting. This is undoubtedly due to the lower draught required, and there being no stirring up of the fuel by poking, as in the ordinary furnaces, as well as to the heating by gas in almost immediate contact with the retorts. At the same time I find there is an accumulation of dust when coke from ordinary cannel coal is used; but by no means to the same extent as from ordinary furnaces.

Thirdly, durability. It is of advantage to use only one kind of fuel in the producer. When coke from various kinds of cannel is used, there is probably a different production of gas—that is, a larger quantity of gas is produced at one time than at another, as the different kinds of fuel are reached; and as the ventilators admitting the secondary air remain at the same adjustment, it follows that a larger or smaller volume of heat is produced. This will give rise to an oscillating action in the heat, and thus possibly cause an oscillation in the expansion of the brickwork. It follows that the durability of the retorts is thereby affected, and different results in durability may be produced in this way. Irregular charging will produce the same results. Thus, if the charge is put in so that there is a thicker bed of cannel at one part than at another, the part where the heavy charge lies will be cooled beyond the average, while that part where the charge is light will be excessively heated. Some kinds of firebrick material will stand this unequal cooling and heating more than others; and even the material from any one manufacturer may vary in this point, and so different results as regards their durability may arise. Those who work four-hour charges must naturally expect a different result from those who work three-hour charges, as every charge cools the retorts. The expansion and contraction must be more frequent with short charges than with long ones; and there is besides the deterioration of the retorts, due to the more frequent rubbing action of the coals being put into the retort, and of the rake in drawing out the residual coke. When speaking of durability, under any system of heating the retorts, consideration must, therefore, be given to the length of time the charges are allowed to run.

The durability of retorts is also due to other causes than the heating and the material used. It is due to the method of setting, to the working on the part of the stokers, and to the work the stokers have to do in the quantity of coals put into the retorts. When, on the old system, only one fire is used to heat the retorts, it is possible to set them so that they will endure as long as the material of which they are made will last; but where two furnaces are employed the retorts are resting upon a base that is destroyed before the retorts are fairly worn out. When speaking of durability, and the results at one works compared with another, regard must be had to the previous methods of setting employed in each works respectively, as well as the duration of the charge. When we consider the higher heats that are usually employed, and the greater weight of cannel carbonized per charge, with often the more frequent charging, I am afraid that any greater durability in the actual working of the retorts will not be realized. Of course, during the time the retorts last they will carbonize a larger quantity of coal. For instance, I find that in the old method of setting and working employed at Greenock, the durability of a retort is equal to the carbonizing of from 300 to 350 tons of cannel; and if this is lengthened to 450 or 500 tons of cannel per retort it will be as much as can be reasonably expected. The producers and regenerative parts will, no doubt, last for years; but the retorts will require more frequent renewal.

What the money saving in labor may be per ton of cannel carbonized my experience does not yet permit me to say; but I shall be disappointed if it is not equal to 25 per cent. of the stoker's wages. The experience of others justifies me in expecting this, and also (from the regularity in the heating of the retorts) that there will be an increased yield of gas per ton of cannel is undoubted.

Clinkering is an important item in the ordinary system of working furnaces, and one which it was expected would be entirely done away with by the regenerative system; but I find this largely depends upon the class of fuel used. Fuel containing much iron in its composition will bridge over and form a clinker very difficult to remove; and my experience is that, although the labor of clinkering is very materially reduced, it is not entirely done away with. By care, however, in selecting the fuel, it may be so reduced as to involve only a small amount of labor in its removal.

I may close these remarks by saying that, generally speaking, it will be found that the regenerative system of heating retorts reduces the heavy toil on the workmen, effects a saving in the cost of labor, enables a greater quantity of gas to be produced by each retort, allows of material economy in the use of fuel, and is altogether a more scientific system of working. But against this has to be placed the first cost, and the greater skill required on the part of both managers and men in the working of the furnaces.

Mr. W. Foulis, of the Glasgow Corporation Gas Works (who was unable to attend the meeting), sent the following communication, which was read by the Secretary:

"Since the last meeting of the Association there has been considerable discussion, in the columns of the *Journal of Gas Lighting* and elsewhere, as to the value of regeneration in gaseous firing. The discussion was inaugurated by what was called a discovery that air could not be heated in flues at atmospheric pressure—an idea which could only have originated from an imperfect knowledge of the most elementary principles of thermo-dynamics. Increased knowledge of the subject enabled the author of this idea to see his error, which he acknowledged in a very straightforward and honorable manner. Then it was said that, although you could heat air, yet it did no good; and that any benefit that was derived from the regenerators was due to the bottom of the setting being kept hot by this means. This idea is, to my mind, about as untenable as the other. In a well-constructed retort bench, with a sufficient mass of brickwork in the foundations, the bottom of the setting is better protected than any of the sides. The front walls and top radiate much more heat than can possibly be lost through the mass of brickwork underneath. Then, again, in very many settings, with ordinary firing, the waste gas flues are carried underneath the bottom retorts; so that any loss by conduction downwards can have but little effect on the efficiency of the furnace. I would also like the author or authors of this idea to consider that in regenerator furnaces for other purposes than retort heating, the regener-

ator is seldom, if ever, placed underneath the furnace to be heated. Yet the benefit of regenerators so placed is undoubted. At the last meeting of the Gas Institute another theory was advanced—viz., that the heating of air was positively prejudicial unless the gas was likewise heated. While I cannot agree with the theories advanced by the author of the paper which contained this idea, there can be no doubt about the fact (which was very early discovered by the late Sir W. Siemens) that to obtain the greatest efficiency in a regenerative furnace it is necessary to heat the gas as well as the air—that is to say, if you have hot air you must, in order to get the best results, have hot gas; and it is likewise true that if you have hot gas you must have hot air. In a retort setting heated by gas from a producer placed either inside or outside close to the setting, and fed with hot coke, the gases from the producer enter the setting at a very high temperature; and in order to get the most perfect combustion and the greatest efficiency, it is necessary to heat the air to the same temperature. In a great deal of the discussion that has taken place on this subject the fact that hot gases have to be dealt with seems to have been entirely overlooked. All those who have had any great experience in the working of regenerative furnaces, and who have found the advantages of a hot air supply as compared with a cold air supply, will, I fancy, pay little attention to the theories advanced by men who have not had that experience, and who try to prove that the advantage does not exist. Still, these theories cannot altogether be ignored. But there would be no difficulty in showing theoretically wherein the advantage of regeneration consists. In the foregoing remarks I have looked at the question rather from a practical point of view; and I shall be very much pleased if they in any way help in the discussion at the meeting."

Natural Gas in Plate Glass Manufacture.

An exchange says the expression, "French plate glass" leads one to think that foreign nations make all of this kind of glass. That is far from being the fact. There are in the United States four works for making plate glass. One is located at New Albany, Ind., one at Jefferson, Ind., one at Crystal City, Mo., and the one described in this paper, at Creighton, Pa. Plate glass is made by casting and afterwards polishing. The pots in which the materials are melted and the glass made are of great capacity, and require heavy and convenient machinery for pouring. The casting is done on a heavy metal slab, larger than the largest sheet of glass produced, and this slab rests on a car which runs on tracks leading from the melting furnaces to the annealing rooms. A large iron roller, running on strips of iron at each side of this table, presses the molten glass into a sheet as the workmen pour it in front of the moving roller. The thickness of these strips of iron on which the roller rolls determines the thickness of the plate of glass. While the glass is yet hot it is thrust into an annealing oven, where the temperature is gradually lowered for several days until it is cold. The surface of the glass is now very rough and uneven, and though it is translucent, it is not transparent. In this form it is used for skylights, and for places where strength and light are required without transparency. After the plate comes from the oven, it is firmly fixed upon a large rotating table or platform which revolves quite rapidly. Over its surface two disks rotate and revolve in such a manner that they cover the entire surface of the glass at each rotation of the platform. The attending workmen throw common river sand upon the surface of the glass, which is kept constantly wet by small streams of water. This process grinds off the rough exterior, after which it is ground with emery, on machines of similar construction. Beginning with coarse emery, they gradually change the grade until the finest powder is used to finish the grinding. After the grinding is complete, the surface is polished by rouge on machines constructed on the very best principles for making perfect surfaces.

From the time the glass leaves the annealing ovens until it is perfectly polished, the workmen examine it, from time to time, for any flaws, bubbles, or defects, as grains of annulled sand. Only those large plates which are free from defects of any kind are polished entire. When a flaw is discovered in a large plate of glass, the plate is cut into smaller ones of marketable dimensions. This branch of the trade requires trained and skillful workmen who have good judgment. After the glass has been properly polished and cut into required sizes, it is boxed ready for shipment. The manufacturers insure large plates of glass, for which the buyer has to pay. This makes the purchase without risk to the purchaser.

The works of the "Pittsburgh Plate Glass Company" are located at Creighton, about twenty miles above Pittsburgh, on the west bank of the Allegheny River. There are about eight or nine acres covered with buildings, along a side-track of the West Pennsylvania Railroad, which are used for the various purposes of manufacture, store-houses, furnaces, casting houses, stables, offices, etc. One of the buildings, 650 feet long by 160 feet wide, is the casting house. It contains sixty ovens for annealing glass, and two furnaces for melting. Each annealing furnace is over forty feet long by nearly twenty in width. Each melting furnace contains fourteen pots. The apparatus for casting consists of two iron tables, seven inches thick and 19 feet long by 14 feet wide; two iron rollers, thirty inches in diameter and fifteen feet long. These tables are on carriages which move on a track which reaches every furnace, and is nearly one mile in aggregate length. There are also cranes, tongs, ladles, and pulleys, which are most conveniently arranged for rapid work. The first building in which the plates of glass meet machinery driven by steam is the grinding house. This building is over 200 feet long by 80 feet wide. There are eight rotary grinding machines in this building. Each machine requires forty-horse power, and all are driven by two double vertical engines. There is a second grinding department which contains two machines of the latest French pattern. These machines require one hundred and twenty horse power, and do most excellent work rapidly.

The glass is smoothed in a building about 100 feet by 200 feet. In this house there are 20 smoothing machines, which require the power of two engines of 40-horse power each to drive them. Next in order is the polishing house. This is the same in size as the smoothing house. There are sixteen polishing machines, each 11 by 20 feet, driven by two engines of over 800-horse power.

The company make their own melting pots, and in this building a steam engine of 30-horse power grinds and mixes clay. There is a department where plate glass mirrors are made, and this requires the help of a large engine to drive machinery for beveling the edges of plates of glass. This department has proved a perfect success, and many beautiful mirrors are made here, ranging in price from $1 to $500.

There is also a large foundry and machine shop, where all the machinery used in the plant is made or repaired; and a shop for making boxes, where an engine runs saws and planers. The company employs 345 men, 45 boys, and 15 women and girls. They have lately built a steam dredge for collecting sand from the bottom of the river for grinding glass. Three million bushels of sand are required each year for grinding purposes alone. The white sand from which the glass is made is shipped from McVeytown, Pa. The amount of glass cast each month is 95,000 square feet. About three per cent. of this is used for skylights; the rest is polished, making an output of 70,000 feet of polished glass per month, after allowance is made for cutting and breakage.

The novel feature about these vast works—where engines aggregating nearly 1,500-horse power are fed by steam, and sixty annealing ovens and two melting furnaces require fuel—is the entire absence of coal, and the use of natural gas in its stead.

The company owns two gas wells, which are about 1,150 feet deep, and they are now running their entire works with a little over one-half the production of one well. The pressure at the well is 240 pounds per square inch. This pressure is reduced at the well to 120 pounds, and, as the line works wide open, the pressure in the regulator at the works is lowered to 80 pounds. The pressure is still further reduced before it enters the furnaces. The pipe which conveys the gas to the works is 4 inches in diameter. The surplus gas is used in the town for heating and lighting; and as they are able to consume but a small quantity of this, compared with the supply, a tube, high in the air, sends out a large flame which lights up the surrounding country. For domestic purposes this fuel has no equal, and it has no superior for manufacturing. The steel works in Pittsburgh use natural gas entirely, melting steel easily with the intense heat produced.

Glass made by this fuel is decidedly superior to that made by the use of coal. No coloring material can get into the melting pots, and the flame of the burning gas is free from impurities which would injure the quality of the glass. Several inches of this glass, when seen through from edge to edge, show no appreciable color. This is the most apparent advantage gained, but there are others of no less importance.

The control which the workmen have over the heat in the melting furnaces, and especially in the annealing ovens, enables them to make glass of great durability and strength.

At present the company is in a flourishing condition, and have all they can do to supply the demand for goods. They make glass cheaper than any other plant in this country, and can compete with either the French or the English, inasmuch as their fuel costs them practically nothing; the gas used taking the place of three thousand bushels of coal per day.

Coal Slag as a Building Material.

The London *Builder* claims that the first steps in the direction of using coal slag for building purposes were due to the initiative of certain Lyons builders who wished to find a cheap, durable, and healthy material for the construction of suburban houses upon sites acquired for comparatively short leases, the contingency of occasional partial inundations being also kept in view. The coal slag was mixed with some slacked lime, and was treated as a concrete. The mass hardened rapidly, and even after a few days the walls

were firm enough to support the joist framings. After the lapse of a month the building was dry. At the time named coal slag was so plentiful that it could almost be had for the asking, and the cubic foot of wall (including transport, scaffolding, and labor) cost about 1½d. After 30 years' experience this mode of construction has become so general in Lyons that the necessary transport of coal slag from a certain distance has raised the cost to about 3d. per cubic foot.

According to the *Wochenschrift*, of the Austrian Architects' and Engineers' Association, the original proportion for mixing was four parts of slag to one part of lime. At first fat lime was used, and later on hydraulic lime; but, in order to obtain greater strength, it is recommended to increase the proportion of lime, and use white lime. The ramming is best effected in layers 6 inches thick. The walls are usually made 1 foot 7½ inches thick, but they can be thinner if the burden they have to support is light. Solid party walls can be made 6 inches to 8 inches in thickness by ramming the mixture between boards, or by forming out of it bricks, which can be built into a wall after drying. For a long time this style of building was confined to works of an unimportant character; but within the last two years it has been used by various architects (particularly M. A. Louvier, of Lyons) for public buildings, and for private houses of large size.

The strength and fire-resisting properties of the composition in question have been successfully demonstrated by M. Louvier in the course of experiments made by him on a relatively large scale. It is further recorded that a nitro-benzine factory near Lyons was burned down, the violence of the conflagration even melting part of the machinery. The walls (made of this slag mixture) were unconsumed—their surface having a glazed appearance—and sustained without repair the ceiling and roof of the restored building. Similar results are said to have been demonstrated by the burning of the Célestins Theater at Lyons.

SPECIAL ENGLISH CORRESPONDENCE.

Communicated By Norton H. Humphrys.

Salisbury, August 10, 1885.

The Beckton Gas and Chemical Works of the Gas Light and Coke Company.—The North British Association of Gas Managers.—Report on Regenerator Furnaces.—Prize Essays.—Gas Profits at Manchester and Salford.—Nuisance from Gas Works at Belfast.

I have on previous occasions referred to the Society of Chemical Industry, and have now to notice one of the features in connection with the usual annual meeting, which was held in London, in a building adjoining the Inventions Exhibition, a few weeks since. This was a visit to the large gas works out on the Essex marshes, on the north side of the river Thames, where the greater portion of the gas which is used in the city of London is manufactured; a special feature of which is that it includes a chemical works where the tar and liquor are worked up into salable commodities. In passing I may take the opportunity of calling the attention of any of your readers who may be interested either in a pecuniary sense, or *con amore*, in the "science of stinks," to the excellent journal issued monthly by this society, which furnishes a valuable record of current applied chemistry; and although the gas engineer does not need to be posted up in the details connected with the manufacture of soda, varnish, matches, or soap, he will find that a casual glance in the direction of the broad subject of chemical manufacture will prove useful as furnishing many a practical wrinkle capable of application to many of the processes which it is his business to superintend. Remembering the limits of space, and the numerous items of interest to the fraternity, that have a claim upon the columns of the American Gas Light Journal, I cannot do better than refer to the excellent description of the Beckton Gas Works which appears in "King's Treatise," and pass on at once to give a few details anent the chemical works. Taking that portion applied to the treatment of tar, the most striking feature is a row of 30 to 40 large stills, with extensive pitch bays on the one side, and the condensers and apparatus for further subsidiary processes on the other. Amongst these is an intricate network of railways, by means of which the various products can be loaded direct into large iron tanks, or collected in barrels and at once transferred into ordinary railway trucks. And every spare inch of ground appears to be utilized for the accommodation of barrels or other receptacles. There is a railway system extending throughout the whole works, it should be remarked, arranged for the transit of coal, coke, purifying material, etc. This is quite distinct from the adjacent railway companies, one of which has a special station just at the main entrance to the works. The principal commodities produced at these tar works are benzol, naphthas, naphthaline, or albocarbon, carbolic acid, creosote, lubricating oil, and anthracene. At the liquor works the ammoniacal liquor is used for the production of sulphate of ammonia; and they include the necessary plant for the manufacture of the sulphuric acid. Here the "spent oxide" from the purifying houses is utilized as a source of sulphur, and after being so treated is restored to its original state—thus two birds are killed with one stone. The "spent oxide" is rendered as good as new, and at the same time the sulphur which it has absorbed from the gas is converted into a valuable product. The spent oxide, however, is not sufficient to provide the whole of the sulphur required, and so other materials have to be purchased. The ammoniacal liquor is distilled in the usual manner, and the vapor passed into open saturators. The foul gases from the saturators are cooled, so as to deposit the steam and water vapors they hold in suspension, and then passed into the sulphur ovens, where the sulphuretted hydrogen is burnt and utilized for the production of sulphuric acid. When we add that there are lime kilns on the premises where the spent lime can be reburnt, it will be observed that the whole of the residuals—tar, liquor, used oxide, and used lime, are turned to practical account in the works.

The North British Association of Gas Managers held their annual Meeting, at Dundee, on the 23d and 24th prox., and it was one of the best gas managers' meetings that have ever been held. A glance at the programme reveals the fact that this statement conveys no invidious comparison. Besides the usual Presidential address and papers, in the course of which the regulation of supply pressure, and control of consumers' gas supply; the limit to which washing and scrubbing may be profitably carried on in the purification of coal gas; a new idea in the way of condensation; clearing gasholders from atmospheric air when first putting them into use; and the rise and progress of coal liming—subjects which of themselves constitute a good programme—there was the special feature of a report on the adaptability of regenerator furnaces for heating retorts in moderate sized gas works, comprising statements from some half-dozen gas engineers who have had several months' practical experience, on a working scale, with this system of firing; and the Allan-Lever prize essays, particulars of which were given in my last letter.

The report on regenerative furnaces must be regarded as a valuable contribution to the literature of this subject. It comprises practical information as to the working of some 250 settings of retorts, mostly on the Siemens system, though the Klönne system is also represented. The verdict adducible from the evidence of several different gas engineers is unanimously in favor of the new system, exhibiting a marked agreement on the important items of saving of fuel, greater durability, and duty per retort (which is the same thing as economy in retort house space), and reduction in wages. Everyone about to make a practical test of this system should read this report, for it appears that in every case some difficulties were experienced at the commencement, although they have all been successfully surmounted. "We are about to extend this system to the whole of our retorts," is the general expression; and, on the whole, the report is so favorable that another year or two will witness a marked extension of the regenerative system in Scotland.

In last month's letter I ventured to favorably anticipate the result of the Allan-Lever prize competition, and this was more than realized. Twelve papers were sent in, and the first and second prizes were carried off by Mr. J. Somerville, of the South Metropolitan Gas Works, and Mr. J. C. W. Folkard, of the Chiswick Gas Works, respectively. So it is remarkable that both the prizes went to London engineers. A Scotch gentleman, Mr. J. Whimster, Jr., of Amagh, coming in third, was awarded a special prize of £10.

The subject of smoke abatement is only indirectly related to the gas industry, in so far as the use of gas heating and cooking stoves may be regarded as a means to that end; and, with the exception of the strange suggestion that local authorities should own the gas works and sell gas at less than cost price, making up the balance out of the rates, the essays do not include any novel suggestions relating to gas companies. Some corporations have now owned gas works for considerable periods, and practical experience shows that as a general rule they regard the works as a source of profit, to be used as a means for reducing the rates. Some few are sufficiently straightforward to put the saddle on the right horse, and sell gas at cost price, leaving the public expenditure to be met in the proper manner. But all are already sufficiently saddled with responsibilities in the way of water supply, or drainage schemes, or other public improvements, without incurring the additional onus of devoting considerable sums from the public funds to the purpose of smoke abatement. If the public cannot be brought to avoid the smoke nuisance of their own free will, I do not think they will ever be forced to do so by act of Parliament. Although the essays are excellent productions in their way, as dealing with the general subject, I must confess to some little disappointment on reading them, having expected that papers submitted to a meeting of gas engineers would give more attention to the position of gas companies in respect to this subject, and show how they might utilize the present demand for cheap gaseous fuel to the mutual advantage of the public and themselves.

The disadvantages consequent upon gas undertakings being owned by town authorities have not lately been rendered prominent. Gas affairs have been so prosperous—there has been an increasing demand, and residuals have

realized good prices—that without charging higher prices than would be the case with a trading company the undertakings have yielded considerable profits. So things have gone swimmingly. The users of gas have been satisfied, while at the same time large sums have been devoted to public improvements. At Manchester the rule for some years past has been that the Gas Committee should hand over the respectable sum of £52,000 to the Improvement Committee; which, in other words, is taking that sum out of the gas consumers' pockets and putting it into the ratepayers'. This year, however, although the demand for gas has increased the same as usual, the Committee have encountered adverse circumstances in the reduced prices obtainable for tar and ammonia, and so find themselves unable to provide the above-named sum. The Gas Committee have decided to apply to the Town Council for relief from this charge, and this will bring up the whole question of gas consumer versus ratepayer. The neighboring borough of Salford also appears to be in a similar position—several thousands pounds sterling per year have also been contributed by the gas consumers to the general funds; and there also a resolution is under consideration as to the advisability of selling gas at cost price. It is very evident that those who take the profit must also take the risk. If the town authorities have made a practice of selling gas at cost price, then they can reasonably claim the right of increasing the price if circumstances occur to increase their expenses or diminish their revenue. But when—as in the case of Manchester and Salford—they have been making large profits, things bear a different complexion; and it is not fair to seek to saddle the consumer with the losses due to bad times. But there are a certain number, in every town where the gas works is owned by the public authorities, who appear to believe in plundering the gas consumer to the greatest possible extent. "If times are good," they say, "make profits out of the gas undertaking; if they are bad, raise the price and still make profits." In times which have now happily passed by gas consumers found representatives to protest against the alleged exorbitant profits made by certain companies. Before long we may expect to see the consumers in certain towns rising to protest in a similar manner against the public authorities, unless the policy of the past is altered. I shall look with much interest for the attitude taken by the gas consumers in the above-named towns in connection with these considerations.

The Belfast Corporation have got into trouble for allowing foul smells—to wit, sulphuretted hydrogen—to emanate from their gas works, to the annoyance of the noses, and to the damage of the paint of certain neighboring residents; having been mulcted, by Mr. Justice O'Brien, at the Antrim County Assizes, in the sum of £10 damage to each of the unfortunates. There is a foul river and some chemical works in the neighborhood which may or may not have contributed to the nuisance. But the very natural anxiety which all bodies of directors feel to avoid any possible cause of offense was used against them by the learned judge. The Gas Committee had received deputations, and promised to do what they could; and, in one instance, had a cover put upon a certain tank. But it is possible that all this was done as a means of extreme precaution, and that promises were made by the Gas Committee with a view of satisfying the deputations without first inquiring as to the truth of the allegations as far as the gas works is concerned. After the decision of Mr. Justice O'Brien, gas committees or boards of directors must avoid being too courteous or sympathizing to complaints of nuisance. They must be careful not to commit themselves, and it will be better to tell the complainants bluntly "not to come here with such nonsense," than to be too attentive and considerate, which course might possibly imply a knowledge of guilt.

Boring for Natural Gas at Cleveland, Ohio.

Advices from Cleveland, Ohio, state that the Cleveland Rolling Mill Company of that city has been drilling for gas on its property in the Eighteenth ward since Oct. 10th, 1884. At the depth of 715 feet a small vein of gas was found, but it was soon exhausted. After passing through the shale the drill entered a vein of limestone 260 feet in thickness. Below this, hard gray sandstone was encountered. While the drill was pounding in the sandstone at a depth of 1,700 feet, the well suddenly filled with water, which, being pumped out, was found to be strongly impregnated with salt. The drilling was continued until a depth of 1,985 feet had been reached, when pure rock salt was found. This vein was 169 feet in thickness, and it required 36 hours to drill through it. The drillers were not in search of salt, but gas, and they continued with the work. The big salt vein was encountered about a month ago. Two weeks later, after drilling through a considerable amount of rock, another but smaller vein was encountered. The drill was still driven downward until it had reached a depth of 2,689 feet, and the drillers were treated to another surprise. This time they found petroleum. Evidences of oil were found in the shape of a peculiar odor about the borings. The drill was passing through very hard rock, and it therefore proceeded very slowly. Every time the sand pump was put down into the well it was filled with oil and water, and several barrels of petroleum were taken out in that manner. The oil is said to be of very fine quality. What has already been found seems to have trickled through the rock from a pocket near the well. No gas has been found since the drill passed below 1,000 feet. It is now producing about one barrel of oil daily. The hole has reached a depth of 2,700 feet. There are slight indications of gas, but it has not yet been discovered in paying quantities.

Technical Journalism.

Ralph W. Pope contributed the following to the August number of the *Electrician:*

Technical journalism is the natural outgrowth of industrial progress, and contributes largely to that development of science and invention which has been characteristic of the nineteenth century. While the more important discoveries are eagerly sought out and made public by the enterprise of the daily press, the quiet workers, who by their skill and ingenuity patiently labor to bring their experiments into practical form, may have toiled for years in comparative obscurity.

Such men must necessarily keep thoroughly abreast of the times, at least so far as concerns their particular line of investigation; and to them the technical journal is indispensable. It must indeed be a stupid periodical which in the course of the year does not bring them information of far greater value than the price of subscription. Such knowledge is therefore a necessity rather than a luxury. While we may derive a certain amount of satisfaction from perusing our favorite daily, it is the technical journal which brings to its supporters the bread and meat of every-day life. Its field is constantly broadening, while bright minds are continually on the lookout for opportunities previously neglected.

The frequent inaccuracy in the minor details of ordinary newspaper work was recognized as long ago as Lord Byron's time, else he would not have replied to the query, "What is fame?" "To be killed in battle and have one's name spelled wrong in the despatches."

Even in the limited experience of the writer, he once figured in the New York *Sun*, with great particularity of street, number, and business position, as the husband of his brother's wife; an error which was perpetrated with such exact accuracy of other details that its origin still remains a profound mystery. Such mistakes are the more readily excused because of the haste with which material must be collected and prepared.

There is, however, another class, which are more properly blunders arising from the ignorance of writers upon the subject they attempt to elucidate. The reporter who described an accident at Jersey City, in which a train plunged through the station and the locomotive went off the wharf, gave as the cause the failure of the "backing" brake. Had he been more familiar with railway mechanism he would have known that while a brake may be used to stop a train, the engine must be reversed to back it. What he doubtless overheard was that the "vacuum" brake failed, as was really the case. It was another scribe, doubtless more familiar with atmospheric exhaustion, whose practical training secured him a position on the *Herald*. This genius examined an East river steamboat after an explosion, and discovered a vacuum in her cylinder six feet long, which had been broken into seven pieces! Scientific accuracy can scarcely be hoped for in such cases; but when we read in a description of a boiler explosion that "the path taken by the boiler was immediately followed by ourselves," we naturally infer that the reporter was blown up as well.

It may be too much to expect that these details can be carefully watched, as it is well known that but a small minority of newspaper readers will detect such errors, unless they are personally familiar with the subject or incident. It is when our metropolitan dailies venture outside of their province that they should exercise more care in the preparation of their matter, or at least refrain from dictating the exact course to be pursued by others. It is a common saying in press circles that every man thinks he can run a newspaper. It is also apparent that every editor knows how to run other people's business as well as his own. In the palmy days of Napoleon III. the modest leader of the New York press at that time would occasionally intimate that if Louis Napoleon would take the advice of the *Herald* many of the difficulties which beset him might be avoided. Whether his eventual downfall could be ascribed to his obstinacy in this respect is a question for the historian, who is more familiar than I am with the mysteries of French statesmanship.

It is frequently the case that under the guise of scientific phraseology a newspaper may cause at least annoyance, and perhaps injury, by gross exaggeration or a misstatement of facts. A recent case which was particularly atrocious was that of the *Evening Telegram*, in which an attempt was made to show that from an artistic and engineering point of view the Bartholdi Statue of Liberty is a failure. Imagine the assurance of a critic of this character in pointing out to an educated engineer, such as we may presume General Stone to be, that the truss-work was not properly planned. Perhaps it was not; but why should it be left to a *Telegram* reporter to point

out technical defects in a work of this character? He then undertakes to prove that in the joining of the iron framework to the copper plates, of which the statue is formed, electrical action must subsequently ensue, which will ultimately destroy the metal at such points. With equal foresight many other dire evils could be predicted, which *might* occur if proper precautions were not taken to prevent them. Fortunately the animus of this remarkable display of newspaper science was thoroughly understood by the public, and the proper allowance made for these extraordinary criticisms. Similar cases arise, however, in which the motive of the attack is more obscure, when the pernicious influence may consequently be more effectual.

The crusade of the press against the overhead wires is an example of the manner in which the people may be incensed against a minor evil, while more imminent dangers beset them on every hand that remain comparatively unheeded. For years the law has recognised the necessity of regulating the construction of buildings, the testing of steam boilers, the inspection of steamboats, and the licensing of engineers and pilots.

We have had a cycle of falling buildings in this city and vicinity within a few months; a reckless builder has been sentenced to prison, and quiet now reigns, the subject being considered stale. No anxiety is manifested in the daily press regarding the thousands of steam boilers "underground," many of them in charge of engineers (?) who are also expected to serve as porters or men of all work in their respective establishments. Among technical papers the *American Machinist* has frequently alluded to the various mechanical death-traps which pervade the community, a recent instance being its reference to the numerous excursion boats which daily ply our harbor in in every direction. Many of these steamers are crowded to their utmost carrying capacity, in open violation of the laws which are supposed to protect the people from the avaricious and unscrupulous owners who risk human life that dollars may be gained. The masses, however, are neither scientific nor mechanical, or if they were they might not be influenced by the opinion of a technical journal; consequently its reasoning, however weighty, is of no avail, because it is misplaced. While those who read its columns may be interested for the time being, there appears to be no manner in which the evils pointed out may be eradicated. The necessary laws exist already, but they are apparently not enforced, excepting perhaps for a brief period under the stimulus of some appalling disaster. In a few days any further reference to it is overwhelmed by the later intelligence of perhaps a more serious calamity.

One of the gravest drawbacks to the influence of a journal is the question as to the honesty of its opinions; in fact, its reputation. It is here that the technical journal finds its path continually beset with thorns. The interests of its readers demand that they shall be enlightened on the merits of new inventions, processes, and materials. They do not care to learn from John Smith that in his opinion the Smith dynamo will supply more Smith lamps per horse power than the dynamo of Jones. Neither do they hanker after Jones's remarks on the Smith machinery. If, however, they have confidence in their favorite electrical journal, they might be glad to obtain, if they could, an official editorial decision.

It is right here that the sphere of the technical journal must be bounded. It should offer a fair arena for the statement and elucidation of facts and theories by those who profess to understand them, under their own names—which, if well known, carry with them the necessary weight; if not, the reader must judge from the article itself whether the author probably understands his subject.

It is often the case that the technical journal, acting solely in the interest of its readers, and without reference to its advertising columns, publishes descriptive matter which is supposed to be beneficial to the inventor, manufacturer, or vender of the article in question. It is too frequently understood that financial inducements are offered to secure what is erroneously considered an endorsement of the article, when, in fact, no opinion of its merits is advanced.

Having in view the fact that the mission of the technical journal is to instruct, inform, and please its readers, the editor should certainly reserve the right to give a favorable opinion if he so desires, but not without careful investigation. His reputation is to a certain extent his capital, and should therefore be guarded with equal consideration. No allotment of stock or admission on the ground floor of a new enterprise should be allowed to bias his judgment; neither should he by his supposed influence lead others to embark in questionable enterprises.

We have in mind various schemes which have been boomed by daily papers. Possibly in some cases such advocacy has been paid for; but if not, the desired result was attained by taking advantage of the technical ignorance of the staff, and thousands of readers were misinformed if not duped.

A recent instance is that of the Hathaway printing instrument, for the introduction of which capitalists are now being invited to invest. It was announced through the medium of various newspapers that the introduction of this machine was to create a revolution in telegraphy, superseding not only the ordinary Morse instruments, but the telephone as well. The fact is that this machine is a very inferior printer, by no means equal to those in actual use 25 years ago. The only patentable features about it are of no practical value whatever.

At the very outset of the electric lighting business in this country a panic in gas stocks was precipitated by the wildest predictions regarding the future of the new light, which was to be produced at so low a cost as to ruin existing gas companies. There was no foundation for such assertions, but many people were led to sacrifice excellent securities without any better reason than that the newspapers prophesied the final overthrow of gas monopolies. This was seven years ago; and the smile of the present holder of gas stocks is broader than that of most electric light owners. Investors in Keely motor stock were not allured into their present holdings by the representations of technical journals. There has never been an exhibition of the Keely apparatus that really warranted an extended newspaper notice. The whole affair has been brought into notoriety by writers who were not sufficiently versed in science or mechanics to detect its fraudulent nature.

It certainly appears as if would-be investors in questionable enterprises of this character should familiarize themselves with the "state of the art," either by continued perusal of journals devoted to such subjects, or else by the employment of trained experts whose opinions are entitled to weight. A purchaser of real estate would be considered lacking in judgment unless he engaged competent counsel to search the title. A similarly prudent course should be adopted by those who propose to secure an interest in inventions which are not in their line of business.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

An Item from Marshalltown, Iowa.—Mr. C. D. Shreve has leased the Marshalltown Gas Works, and assumed charge of the plant some three months ago, or on date of June 1st. The present gas prices in that city are very fair, all things considered. The highest charge is $2.70 per thousand, the lowest being $2.50; but Mr. Shreve has determined that these rates will suffer a "cut" in the near future. Mr. Shreve has our thanks for his appreciation of our efforts to make the Journal of real value to the American gas manufacturer.

The Gas Machine Man.—Mr. L. C. Huber is General Manager of the Eureka Light Company, of Louisville, Ky., and therefore is very anxious that users of artificial light should be of the opinion that he has under his control the very best, if not the only, means of securing the proper illumination of their stores, factories, streets, and dwellings. The gentleman from Kentucky is quite energetic in his attempts to introduce the Eureka machine, and, of course, is profuse in his claims regarding the marvelous economy and efficiency of the aforesaid apparatus. No one could reasonably find fault with Mr. Huber on that account, since every salesman is apt to think rather highly of his own wares, and seldom neglects an opportunity to make others acquainted with his "state of mind" on the subject. Mr. Huber some time ago determined that the medium-sized towns of the West offered excellent situations wherein to dispose of his wares, and, amongst others, he selected Franklin, Ind., as an eligible location. Franklin possesses a particularly wideawake gas company, the officials of which were not disposed to allow Mr. Huber to conquer their territory without having a passage-at-arms, or at least making some show of resistance. The gas machine man selected the depot of the J., M. and I. Railroad Company as his first point of attack, and after much cajoling and supplication obtained leave from the railway officials to put in a "Eureka." When the apparatus had been in use for a certain space of time, or over a period sufficiently lengthy to demonstrate the worthlessness of the light generated (not to mention anything about its unreliability and the constant menace involved in its presence), the railway managers ordered that the great Eureka light generator and distributor be removed from the depot premises. This order caused Huber's indignation to get the better of his judgment, and impelled him to compile the following circular, in which he sought to explain "To the People of Franklin" (this last is the headline to the circular, and is printed from poster type of heroic size), why it was that the railroad folks had "cast him out." The "greatest circular effort" of Mr. Huber's life is herewith faithfully reproduced—*i. e.*, so far as its composition is concerned:

"*To the People of Franklin*:—Some six weeks ago I came to your city and put in operation, in the J., M. & I. depot, one of our gas machines, with a view to selling it to the railroad company, and at the same time exhibit the light to the citizens. So far there has been no objection raised by any one of the citizens as to the quality, quantity, and price of our light, except those directly interested in the gas company of your city. They cannot make a case against us in any one particular to condemn our light, and, failing in this instance, they have showed their great and magnanimous spirit by, as a last resort to get rid (I will not say of a rival company, for they are not considered so by us nor anyone else) of us, they notify the J., M. & I. Rail-

road that if our machine is not taken out of the depot, they (the great gas company) will not ship another carload of coal over the road.

"The above order is certainly one from a great man (?) or set of men with great minds (?). Of this matter, however, I will leave you to be the judges. I came to your city to offer you a good, cheap, and safe light, and I know I have substantiated my word. I came to transact my business in a fair and legitimate way. I said nothing against the coal gas company, and only asked to be let alone. There were remarks made about the explosiveness of my gas calculated to injure me; but on account of the ignorance of those who made the charges I passed them by unheeded.

"But since the gas company has gone to so much trouble to get rid of me, I propose now to challenge them to several tests as to the explosiveness of the two gases under like and unlike circumstances, the quality and quantity of light, and the price of light. You will be given due notice of the nature and date of my challenge, and I want everybody to see it. I came among you to offer you all just what you wanted, and until your citizens tell me to take my machine out of your city I will not do it, for the depot is not the only house in town. I have been notified to take the machine out of the depot. Not that it was not doing all that I claimed for it, but because of the threat of the gas company to withdraw their patronage from the J., M. & I., in the way of shipping coal over their road if they did not remove it.

"With a gas company composed of men little enough for such work as this, I do not wonder that you have had reason to complain of the gas they furnished as to quality, let alone the price.

"I do not propose to be 'bull-dozed,' and it remains for you to say whether your citizens will continue to be 'bull-dozed' in the future, as you have in the past, by the gas company. L. C. Huber,

"Gen'l Man. Eureka Light Co., Louisville, Ky."

A perusal of the above document is calculated to incline one to the belief that Mr. Huber will never be called to fill the position of Editor-in-Chief to the Louisville *Courier Journal*, and another impression conveyed by it is that Mr. Huber will make but a poor success in the business of selling Eureka machines. Indeed we call attention to Mr. Huber and his circular simply to put other gas companies in that section of the United States on their guard as to what they may expect at his hands when he pays them a visit. The truth of the matter is that the railroad people at Franklin dispensed with Mr. Huber and his machine simply because the light supplied under its working was valueless, and the apparatus was a continual menace to the safety of the premises in which it was located.

A New Gas Company.—Girardville (Pa.) is to be lighted by gas. A company has been organized, and we understand that the work of construction is now in progress.

The Fostoria (Ohio) Natural Gas Search.—Some three weeks ago the drillers in charge of the Fostoria gas well boring reported that when they had reached a depth of almost 1,800 feet a strong vein of salt water was encountered, and sinking operations were suspended. The well will be "shot," and if an increased flow of gas is not secured, the enterprise will probably be abandoned.

The Light of the Future a Thing of the Past.—At least such an illustration is afforded by the recent action of the Massillon (Ohio) City Council. Probably incited to such action by long-continued complaint on the part of the taxpayers—the complaints being based on inadequate lighting service and extravagant cost—the Massillon councilmen, after protracted debate, at a session held Thursday, August 6th, voted to reject all bids for lighting the city streets with electricity. They also ordered that the electric conductors be removed within ten days from the passage of the order, and further determined that the gas company shall hereafter supply the public with light on streets and in the public buildings. We venture to say that many another Western city and town will follow the example set by Massillon.

Street Main Mileages of Brooklyn (N. Y.) Gas Light Companies.—The seven gas companies doing business in the City of Churches have a total main mileage of 434.93. This mileage is apportioned or owned as follows:

Name of Company.	No. miles of main.
Brooklyn	71.72
Metropolitan	47.29
Citizens	38.18
Fulton Municipal	61.60
Nassau	69.18
Peoples	43.48
Williamsburgh	103.48
Total	434.93

Striking Lamplighters.—During a part of the month of August many of the streets of Paterson, N. J., were left in darkness in consequence of the strike of 16 lamplighters whose duty was to attend to the naphtha street lamps with which the larger portion of the night illumination of that city is supposed to be accomplished. The New York and New Jersey Globe Gas Light Company's managers have the contract for maintaining the Paterson naphtha lamps, and it would seem as though the "job" cannot be a very profitable one when it is remembered that they assumed the work at the rate of $11.50 per lamp per year. It is asserted they are losing money at that rate of compensation, and we are free to confess that the gas men in this neighborhood will not feel badly over the fact. The lighting company employed 16 lamplighters to attend to 966 oil and naphtha lamps, and the men were paid for this service at the rate of $45 each per month. The time consumed in the performance of their labor could safely be put at 14 hours out of each 24—Sundays and holidays proved no exception—and when it was proposed that they make a choice between submitting to a reduction in wages of five dollars per month, or that two of their number be discharged, to the end that the routes of the latter might be divided up between the remaining fourteen, it was but natural that complaints ensued. The men refused to consider either proposition and a crisis ensued, on date of Wednesday, August 12th, when the company handed a discharge notice to one of the workmen. The entire force went on strike, and two-thirds of the city's streets were left in darkness—although the latter portion of this statement does not convey any striking intimation of great hardship, since it is a debatable question in the minds of many Patersonians as to whether they were not better off with the naphtha lamps unlighted than when the same ill-smelling vessels were supposed to be in action. It is a wonder the people of that busy city have been content with the street lighting service rendered by the New York and New Jersey Globe Gas Light Company, and we will venture the assertion that their further stay in Paterson is likely to be "limited." The central, or business portion of Paterson, however, is lighted by gas, and is well lighted, too. We have not been advised as to the final outcome of the strike, but suppose that some sort of a truce has been patched up.

The Cows Were at Fault at New Orleans, La.—A New Orleans correspondent on the staff of one of the New York city dailies, writing under date of Aug. 8th, shows that a certain portion of the Crescent City is laboring under trouble similar to that experienced in Paterson, at least in so far as the extinguishment of oil street lamps is concerned. There the similarity ceases, for instead of strikers being at the bottom of the New Orleans eclipse, we learn that the cows were at fault. The correspondent thus explains the matter: "The part of this city corresponding to Brooklyn, and which is known as Algiers, on account of the piratical nature of its early inhabitants, and all of the rear wards of the city, are without gas street lights. The oil lamps with which the territory has hitherto been lighted have been a delusion. Many posts were knocked down by the cows, and the lamps of those standing were seldom lit."

Ramsdell's Esthetic Taste.—Visitors to the office of the Vincennes (Ind.) Gas Light Company on Second street in that city, especially if they are from other localities, will be rather astonished at the fact that Brother Ramsdell has blossomed out into a furnishing decorator of the most esthetic sort. This addition to his reputation has been fairly gained, and as the result of his labor he now has the neatest business office in bustling Vincennes. The room has been divided into two handsome apartments by means of a partition fitted with wide folding doors—the rear division being allotted to the purposes of the directors, while the front section will accommodate Mr. Ramsdell and his assistants. The woodwork is all cherry, and the furniture and decorations are of the handsomest description. Brother R. commissions us to extend an invitation to the fraternity to pay him a visit at his new quarters.

Personal.—Mr. P. J. Wood has been reappointed Superintendent of the Wilmington (Ohio) Gas Works. Mr. Wood was in the employ of the Stacey Manufacturing Company, of Cincinnati, for sixteen years, and resigned his position with them in order to assume charge at Wilmington once before. At the request of the Stacey Company, when that firm secured the contract for the erection of the East End station of the Cincinnati Gas Light and Coke Company, Mr. Wood returned to his old post, and remained there until the station was completed. Now, as before intimated, he again resumes charge of affairs at Wilmington.

The "Interstate Gas Company."—Such is the rather high-sounding appellation selected by a band of schemers (with headquarters at St. Louis, Mo.) wherewith to designate themselves. As near as we can make the matter out the "Interstate" managers propose to build gas works wherever such operation presents a likely field for profit, or wherever stock can be sold. They are to build on construction bond basis, retaining the bonds in their own keeping. The scheme is rather stale, but we understand they do not claim any novelty for it. They do claim novelty for the style of con-

struction, as this is adapted to accommodate what they call the Chamberlain process, although their Chamberlain process resembles that "discovered" by "Col." Chamberlain in no respect whatever. Yet freedom from such resemblance must certainly be in its favor—certainly, the new system cannot be expected to show poorer results than those recorded against the "Col's." pet project. A year or two (with a strong likelihood of the first-named period proving long enough) and it may be said of the "Interstate" that it died intestate. Reason—nothing to dispose of.

Seeking Control.—A special to the New York *Daily Tribune*, dated Pittsburgh, Pa., Aug. 18th, says: "Dr. Hostetter having bought the Pennsylvania Fuel Gas Company, it is now reported that he is trying to purchase a majority of the stock in the Philadelphia Company, with the pur pose of consolidating the two. The stock of the latter company was bought up rapidly to-day at from 49 to 51. It is said that Dr. Hostetter has been quietly absorbing the stock for some time back." The companies alluded to are purveyors of natural gas; and, as is well known, Dr. Hostetter is very largely interested in the Pittsburgh companies engaged in the manufacture and sale of coal gas.

Cheaper Gas for Washington, Ohio.—Mr. J. M. McLean, Secretary of the Washington Gas Light Company, writes us that a new schedule of gas rates goes into effect there on date of September 1st. The figures are as follows;

A monthly consumption of less than 500 cubic feet.... $2.50 per M.
" " " over 500 " " .... 2.20 "

All consumers who use 2,000 feet of gas and over per month will be entitled to a reduction of ten per cent., provided the bills for same be paid within the month succeeding the one in which the gas was used. As an inducement for consumers to use gas in heating and cooking apparatus the company agrees to supply gas for such uses in addition to that employed for illumination on the same premises, at a uniform charge of $2 per thousand, the only condition being that at least 1,000 cubic feet be consumed for all purposes in the 30 days. This is a novel plan, and a good one, we think. The circular sent out by the Secretary calls attention to the economy, safety, comfort and cleanliness of gas stoves for cooking operations, and notes that a complete stock of the same may be inspected at the company's office. It also conveys the information that gas stoves will be placed on trial in the houses of consumers, and should the experimenters not be pleased with them, the apparatus will be at once removed. The company sells the stoves at cost, and makes the connection to same without charge to the consumer. Mr. McLean's company has undoubtedly done the liberal thing to its patrons, and the new rates ($2 and $2.20) are fair in every ense. Washington Court House (for so the name of town should be written) contains but 4,500 inhabitants, and we might name a dozen towns (each possessing a far greater population than the place spoken of above) within two hours' journey from New York city where higher gas rates prevail—and leave Brooklyn entirely out of the calculation. The comparison is certainly one not greatly redounding to the credit of the wisdom of the gas men in this vicinity. Judging from Secretary McLean's final lines, he does not propose to stop at the last announcement, since he closes the circular by saying: "By way of a stimulant to those who are now burning gas, and as inducement to those who do not, we will say that any permanently marked increase in our sendout will be promptly met by a corresponding reduction in price." He means it.

Victims to Kerosene.—In the past month has been witnessed a great sacrifice of human life due to the careless handling of kerosene. It is an absolute fact that, from a hasty reading of our exchanges, we learn of the taking place of no less than 40 deaths traceable to the kerosene horror. The plain truth thus brought out is that the laws regarding the sale of kerosene below a certain specified standard are absolutely disregarded.

Consolidation of Electric Lighting Companies.—During the last month the long-agitated scheme looking to the consolidation of the electric lighting interests of Boston, Mass., was consummated. The amalgamated corporation has a capital of 700,000 shares, of which the Brush interest was assigned 250,000 shares, the Weston and Merchants branches being allotted 225,000 shares each.

Suicides by Gas.—During the fortnight the press despatches record the taking place of two suicides who selected gas inhalation as the easiest way of "shuffling off this mortal coil." The first case is that of Fanny Wagner, a young woman who served as a domestic in the family of a Baltimore (Md.) household. Her death occurred on date of August 16. She had closed the windows and door to her apartment as securely as possible, removed the tips from the gas burners, turned on the flow, undressed herself and went to bed. Death had taken place before discovery of her condition was made.

The second case was that of William Carleton, an actor and playwright, who occupied a hall room on the third floor of premises No. 316 East 14th street, this city. Carleton at one time was quite prominent in the ranks of the theatrical profession; but a long course of dissipation (he was in the 58th year of his age) had alienated him from his friends. Investigation clearly proved that his death, as the consequence of an inhalation of illuminating gas, was premeditated.

Almost Completed.—The extensive systems of enlargements commenced at the Newark (N. J.) Gas Company's works, by President and Engineer Vanderpool, some time ago, are approaching completion. Mr. Vanderpool has certainly had a busy time of it this summer; but, mentally and physically, he will be a gainer during the coming winter, even though he did forfeit his summer vacation. The new plant of the Newark Company will be complete in every essential and particular.

Natural Gas Discovered in Canada.—A despatch from Montreal states that on the afternoon of August 10 a gang of laborers were engaged in sinking a well in the township of Point-aux-Trembles. When they had reached a depth of 36 feet work for the day was suspended. In the evening the keeper of an adjacent tollgate, in company with a party of friends, visited the well-hole, and while making an inspection of the progress that had been made on the work one of the party ignited a match for the purpose of lighting a cigar. The visitors were rather surprised when a slight explosion occurred, and were astonished when the explosion was followed by a roaring and hissing sheet of flame that spouted over the well mouth to a height of 20 feet or more. Shovels were procured, and 16 feet of clay had to be thrown into the hole before the flames were extinguished. Even with that covering of earth the gas flow was not entirely prevented.

Striving for Cheaper Gas at Green Bay, Wis.—Mr. Jas. G. Miller, of the Green Bay Gas Light and Fuel Company, has determined upon giving the experiment of cheap gas a fair trial in that township near the great pine forests. In order to induce an extended use of gas he informs us that all consumption registered from and after date of September first which equals or exceeds the quantity of 1,000 cubic feet per month will be charged for at the rate of $3.50 per thousand, subject to a discount of $1 per thousand provided the bills for same be paid on any one of the first five business days of the month. In the old rate the discount was but 50 cents per thousand. The gas makers of the West are thoroughly conversant with the fact that the new schedule at Green Bay is a low one; and Mr. Miller deserves credit for this move. For years back he has had much to contend against.

This one not a Suicide.—The following from the New York *Daily Times*, date of Sunday, August 24, explains itself: "Wilkes-Barre, Pa., Aug. 23.—J. C. Waldron, of East Smithfeld, Bradford County, Pa., registered at the Summit Hotel, in this city, at midnight last night. He was shown immediately to his room on the third floor by the clerk. This morning, about 7:30 o'clock, one of the inmates of the hotel went up to his room to call him for breakfast. A rap on the door brought no response, and considering that he had retired at such a late hour no further attempt was made to arouse him. One and a half hours later a youth named Feterburg, who was playing in the upper halls, came down and said he smelled gas. The proprietors suspicions were aroused, and he went up to the apartment, but found the door was locked. He called an officer, who forced the door open and found Waldron lying dead upon the floor. The room was filled with gas, and the burner key was turned on. The victim had been in bed, but there were indications that he had had occasion to get up during the night, and had been suffocated before getting back. Money to the amount of $1,675.71 was found, which, together with his books and papers, was deposited at the Mayor's office. Waldron was 40 years of age, and was well known in this city and the surrounding county as a prominent dealer in cattle, which he shipped by rail or drove from Bradford."

Water gas is sold in Wilkes-Barre.

Killed by the Electric Current.—The New York *Daily Sun*, date of August 26, contained the following: "New Orleans, La., Aug. 25.—Late yesterday evening a party of youths, from 18 to 21 years of age, gathered around the works of the Louisiana Electric Light Company on Feliciana street and toyed with the wire. They had been in the habit of unwinding the wire from a broom, tying a stone or other weight to one end of it, throwing it over the electric wire, and making the unweighted end fast to a gate knob. When the current was turned on the experimenters would seize hold of the broom wire in order to experience an electrical shock. Last evening R. E. Ahrens, becoming bolder than his companions, touched his tongue to the wire. The shock prostrated him, and his brother exclaimed, 'My God, he is killed.' At these words the sufferer arose to his feet and said, 'No; I am not yet dead.' The words had hardly been uttered when he fell to the ground, a corpse."

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

Editor—JOS. R. THOMAS, C.E
Manager—C. E. SANDERSON.

PUBLISHED ON THE 2ND AND 16TH OF EACH MONTH
At No. 42 Pine Street, New York.

This is a recognized official organ of—
LIGHT, HEAT, STEAM, WATER-SUPPLY,
VENTILATION, SANITARY IMPROVEMENT,
AND GENERAL SCIENCE.

TERMS

SUBSCRIPTION—Three Dollars per annum, in advance.

AGENTS

NEW YORK—AMERICAN NEWS Co. 39 and 41 Chambers St.
BOSTON—S. M. PETTENGILL & Co., 6 State Street.
PHILADELPHIA—PRATT & Co., Corner 9th and Arch Streets.
England—C. W. HASTINGS, 23 Buckingham St., London, W. C
Germany—B. WESTERMANN & Co., of New York

WEDNESDAY, SEPTEMBER 2, 1885.

Patents in Belgium and Austro-Hungary.

The Society of Arts *Journal* notes that from the time the law of 1854 came into force to the end of 1883, no less than 29,213 patents of invention, 26,247 of importation, and 8,674 of perfectionment or improvement, making 64,134 altogether, were granted in Belgium. During the same period 45,525 patents, not including those of improvement, were abandoned or annulled, the following figures corresponding to the years, beginning with the second—20,457, 11,599, 5,755, 2,695, 1,571 988, 665, 412, 292, 256, 157, 118, 90, 109, 85, 27, 12, 14, 23, that is to say, more than 45 per cent. of the patents were abandoned after the first year. In Austro-Hungary, from 1852 to 1884, there were granted 34,569 patents.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks,
16 WALL ST., NEW YORK CITY.

SEPTEMBER 2.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	92	93
Central	440,000	50	60	70
" Scrip	220,000	—	47	57
Equitable	2,000,000	100	136	140
" Bonds	1,000,000	—	107	110
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	110	113
Mutual	3,500,000	100	135	137x
" Bonds	1,500,000	1000	104	107
Municipal, Bonds	750,000		—	—
Northern	125,000	50	50	—
" Scrip	108,000			
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	130	132
Citizens	1,200,000	20	84	86
" S. F. Bonds	320,000	1000	106	110
Fulton Municipal	3,000,000	100	158	160x
" Bonds	300,000		104	108
Peoples	1,000,000	10	86	88
" Bonds	290,000	—	105	110
" "	250,000	—	90	95
Metropolitan	1,000,000	100	94	96
Nassau	1,000,000	25	125	127x
" Ctfs	700,000	1000	98	99
Williamsburgh	1,000,000	50	155	160
" Bonds	1,000,000	—	111	114
Richmond Co., S. I.	300,000	50	64	75
" Bonds	40,000	—	—	—
Out of Town Gas Companies.				
Buffalo Mutual, N. Y.	750,000	100	80	85
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	103	115
" " Bonds.	124,000	—	105	110
Chicago Gas Co., Ills	5,000,0000	25	130	140
Peoples G. L. & C. Co., Chicago, Ills			8	12
Cincinnati G. & C. Co.			180	182
Consolidated, Balt.	6,000,000	100	47	48
" Bonds	3,600,000		107	107½
Central, S. F., Cal.			—	58
Capital, Sacramento, Cal.			56	—
Hartford, Conn	750,000	25	123	129
Jersey City	750,000	20	145	—
Laclede, St. Louis, Mo.	1,600,000	100	100	105
Louisville, Ky	1,500,000	50	95	100
Montreal, Canada	2,000,000	100	181	182½
New Haven, Conn		25	166	170
Oakland, Cal			29	30
Peoples, Jersey City		—	45	—
" " Bonds			—	—
Paterson, N. J		25	90	—
Rochester, N. Y		50	75	80
Washington, D. C	2,000,000	20	212½	—
Wilmington, Del		50	199	210
Yonkers		50	41	44
St. Louis, Missouri	600,000	50	—	625x
San Francisco Gas Co. San Francisco, Cal.			56¾	57½
Havana (Cuba) Gas Co.	3,000,000	100	8	—
" Bonds	550,000			

Advertisers Index.

GAS ENGINEERS. Page

Jos. R. Thomas, New York City 129
Wm. Henry White, New York City 127

GAS WORKS APPARATUS AND CONSTRUCTION.

James R. Floyd, New York City 135
T. F. Rowland, Greenpoint, L. I. 135
Deily & Fowler, Phila., Pa. 135
Kerr Murray Mfg. Co., Fort Wayne, Ind. 135
Stacey Mfg. Co., Cincinnati, Ohio 135
Bartlett, Hayward & Co., Baltimore, Md. 135
Morris, Tasker & Co., Limited, Phila., Pa. 134
Davis & Farnum Mfg. Co., Waltham, Mass. 136
Tanner & Delaney Engine Co, Richmond, Va. 134
R. D. Wood & Co., Phila., Pa. 134
Southwark Foundry and Machine Co., Philadelphia, Pa. 134

GAS AND WATER PIPES.

A. H. McNeal, Burlington, N. J. 132
Gloucester Iron Works, Phila., Pa. 132
Warren Foundry and Machine Co., Phillipsburgh, N. J. 132
Mellert Foundry and Machine Co., Reading, Pa. 132
Cincinnati and Newport Iron and Pipe Co., Newport, Ky. 132
Fox & Drummond, New York City 132
Ohio Pipe Co., Columbus, Ohio 132

PIPE JOINTS.

Pancoast & Maule, Philadelphia, Pa 127
Rollstone Machine Company, Fitchburg, Mass. 127

SCRUBBERS AND CONDENSERS.

G. Shepard Page, New York City 133

REGENERATOR FURNACES.

Charles F. Dieterich, Baltimore, Md. 52

GAS ENGINES.

Schleicher, Schumm & Co., Phila., Pa. 112
Clerk Gas Engine Company, Phila., Pa. 128

RETORTS AND FIRE BRICK.

J. H. Gautier & Co., Jersey City, N. J. 130
B. Kreischer & Sons, New York City 130
Adam Weber, New York City 130
Laclede Fire Brick Works, St. Louis, Mo. 130
Brooklyn Retort and Fire Brick Works, Brooklyn, N. Y. 130
Borgner & O'Brien, Phila., Pa. 130
William Gardner & Son, Pittsburgh, Pa. 130
Henry Maurer, New York City 130
Chicago Retort and Fire Brick Works, Chicago, Ills. 130
Baltimore Retort and Fire Brick Co., Baltimore, Md. 130
Standard Gas Retort and Fire Brick Co., Ironton, Ohio. 130
Oakhill Gas Retort and Fire Brick Co., St. Louis, Mo. 130
A. T. Chur, New York City 137

CEMENTS.

C. L. Gerould, Manchester, N. H. 127
Brooks, Shoobridge & Co., New York City 127
E. Thiele, New York City 127

GAS STOVES.

American Meter Co., New York and Philadelphia 131
The Goodwin Gas Stove and Meter Co., Philadelphia, Pa. 140

GAS METERS.

Harris, Griffin & Co., Phila., Pa. 128
American Meter Co., New York and Philadelphia 129
The Goodwin Gas Stove and Meter Co., Phila. Pa. 129
Helme & McIlhenny, Phila., Pa. 129
Maryland Meter and Mfg. Co., Baltimore, Md. 128
D. McDonald & Co. Albany, N. Y. 129
Nathaniel Tufts, Boston, Mass. 128

EXHAUSTERS.

P. H. & F. M. Roots, Connersville, Ind. 129
Smith & Sayre Manufacturing Co., New York City 134
Wilbraham Bros., Philadelphia, Pa. 135

GAS COALS.

Penn Gas Coal Co., Phila., Pa. 137
Perkins & Co., New York City 136
Newburgh Orrel Coal Co., Baltimore Md 137
Despard Coal Co., Baltimore, Md. 137
Chesapeake and Ohio R.R. Coal Agency, N. Y. City 137
Westmoreland Coal Company, Phila., Pa. 137

GAS ENRICHERS.

W. H. Doan, Cleveland, Ohio 127

VALVES.

Ludlow Valve Manufacturing Co., Troy, N. Y. 132
John McLean, New York City 132

GAS LAMPS.

Siemens Regenerative Gas Lamp Co., Philadelphia, Pa. 133
G. Shepard Page, New York City 137

GAS KILNS AND OVENS.

Thompson Gas Kiln and Oven Co., New York City 129

PURIFIER SCREENS.

John Cabot, Lawrence, Mass. 108

STREET LAMPS.

J. G. Miner, Morrisania, New York City 101
Bartlett Street Lamp Mf'g Co., New York City 129

BURNERS.

G. Gefrorer, Phila., Pa. 134

PURIFYING MATERIAL.

Connelly & Co., New York City 129

STEAM BLOWER FOR BURNING BREESE.

H. E. Parson, New York City 127

PIPE COVERINGS.

Chalmers-Spence Company, N. Y. City 127

GAS FIXTURES.

Mitchell, Vance & Co., New York City 127

STEAM PUMPS.

A. S. Cameron Steam Pump Works, N Y. City 129

HYDRAULIC ELEVATOR.

Lane & Bodley Company, Cincinnati, Ohio 129

SHAFTING, PULLEYS, ETC.

A. & F. Brown, New York City 129

HYDRAULIC MAIN.

A. E. Boardman, Macon, Ga. 129

BOOKS.

The Chemist's Assistant 127
King's Treatise 139
Scientific Books 138
Management of Small Gas Works 137
Newbigging's Gas Manager's Handbook 130

WANTED,

A Second-Hand 6 or 8 Inch Steam-Jet Exhauster,

COMPLETE.

MIDDLETOWN GAS LIGHT CO.,
628-9t Middletown, Orange County N. Y.

SUPERINTENDENT WANTED

For a small gas works in a Western Territory. Mild, healthful climate. Gas made from soft coal. Applicant must be well recommended in all respects, and be competent and willing to set meters, repair leaks, keep fixtures in order, etc. Address
628-9t "A. B. C.," care this Journal.

FOR SALE.

Second-Hand Gas Apparatus.

One Condenser, 4½ ft. diameter by 13 ft. in length over all, containing 150 two and one-half inch tubes, 8 ft. long with 12-in. connections and bye-pass.

Two Smith & Sayre (12-inch) Steam-Jet Exhausters, with **3 Self-acting Bye-Passes.**

Four Purifying Boxes, 10 ft. by 14 ft. by 3 ft., with 12-inch connections and center seal.

All in good order, and will be sold cheap. Address
PETER P. MILLER, Manager Citizens Gas Co.,
Buffalo, N. Y.

FOR SALE,

Second-Hand Gas Apparatus.

The Louisville (Ky.) Gas Light Company wishes to dispose of the following:

15 Sixteen-Inch Chapman Valves.
6 Twelve-Inch Chapman Valves.
2 Twelve-Inch Center Seals & Connections.
2 Smith & Sayre Gas Steam Governors.

All in good order, and will be sold at low figures. Address inquiries to A. H. BARRET,
Engineer's Office, Louisville (Ky.) Gas Company.

DYCKERHOFF PORTLAND CEMENT

Is superior to any other Portland Cement made. Its extraordinary strength permits a greater addition of sand, while its acknowledged uniformity insures the most reliable and strongest work. It is therefore the most economical to use. Circulars, with testimonials and tests, sent on application.

E. THIELE,
SOLE AGENT, U. S.,
78 William Street, - - New York.

BROOKS, SHOOBRIDGE & CO.

Best English Portland Cement

WORKS: GRAYS, ESSEX, ENGLAND.
New York Office, No. 7 Bowling Green.

PATENTS.

FRANKLIN H. HOUGH,
Solicitor of American & Foreign Patents,
925 F. ST., WASHINGTON, D. C.
(NEAR U. S. PATENT OFFICE.)

Personal attention given to the preparation and prosecution of applications for Letters Patent. All business before the U. S. Patent Office attended to for moderate fees. **No Agency in the United States possesses superior facilities for obtaining Patents,** or for ascertaining the patentability of inventions. Copies of patents furnished for 25 cents each. Correspondence solicited.

WM. FARMER, ENGINEER,

32 Park Place, Room 36, New York.

THE CHEMIST'S ASSISTANT; OR, KINDERGARTEN SYSTEM OF CHEMISTRY.

A system by which the elements and their valences are represented by illustrations and solid bodies.

BOX AND PAMPHLET COMPLETE, $2.50.

GAS CO. OFFICERS,

It will "Pay the Piper,"

If he aims to pipe well for STEAM, WATER, GAS, ACIDS, OILS, AMMONIA, &c., to examine this UNION, which requires no packing, but is always ready for instant use. When you next order Fittings of any Dealer, ask for a sample American Union to come with them, and it will tell you the whole story, or we will, if you write us for particulars.

PANCOAST & MAULE,
PHILADELPHIA, PA.

READ AND REFLECT.

HODGE'S UNIVERSAL ANGLE UNION, Pat'd

A new and important Pipe Fitting for Steam, Water, or Gas. Combining a variable angle or elbow and a union. Saves pipe, saves time, decreases friction and radiation, gives a union joint at every angle, and **can be set at any angle** at which it is desired to run the pipe.

HODGE'S SWIVEL FLANGE,
A common sense article, designed to save time and money.

MANUFACTURERS AND WHOLESALE AGENTS,
ROLLSTONE MACHINE CO.,
142 Water St., Fitchburg, Mass.

GEROULD'S IMPROVED RETORT CEMENT.

Used by most of the Gas Companies of the United States with perfect satisfaction. Manufactured by

C. L. GEROULD,
Manchester, N. H.

N. B.—As Manchester is a shipping point, all freight can be shipped as cheaply as from Boston or New York.

MITCHELL, VANCE & CO.,

MANUFACTURERS OF

Chandeliers

and every description of

GAS FIXTURES.

Also manufacturers of Fine Gilt Bronzes and Marble Clocks, warranted best time-keepers. Mantel Ornaments, etc.

Salesrooms, 836 Broadway, N. Y.

Special Designs furnished for Gas Fixtures for Churches, Public Halls, Lodges, etc.

W. H. DOAN,

REFINER OF

NAPHTHA and GASOLINES

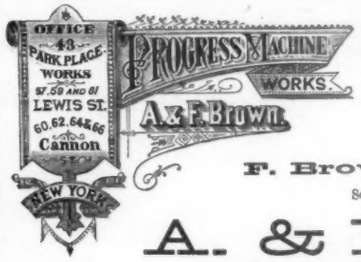
ALSO MANUFACTURER OF

A Special Grade of Naphtha for Gas Companies

FOR ENRICHING COAL GAS.

Correspondence solicited.

No. 43 Euclid Avenue, Cleveland, Ohio.



Shafting, Pulleys, HANGERS.

F. Brown's Patent Friction Clutch.

Send for Illustrated Catalogue and Discount Sheet to

A. & F. BROWN,

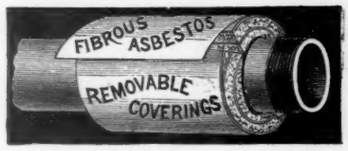
No. 43 Park Place, New York City.

Pipe Coverings.

Fireproof, Non-Conducting Coverings for

STEAM PIPES, BOILERS,
And all Hot Surfaces.

Made in sections three feet long. Easy to apply; light and cheap.



Asbestos Materials, Fibre, Braided Packing, and Cement. These goods are used at Continental Works, Br'klyn.

CHALMERS-SPENCE COMPANY, 419 & 421 EIGHTH ST., N. Y.

Parson's Steam Blower,

FOR IMPROVING BAD DRAUGHT IN BOILERS, AND FOR BURNING BREEZE OR OTHER WASTE MATERIAL.

PARSON'S TAR BURNER,

FOR UTILIZING COAL TAR AS FUEL.

PARSON'S AIR JET TUBE CLEANER,

FOR CLEANING BOILER TUBES.

These devices are all first-class. They will be sent to any responsible party *for trial.* No sale unless satisfactory. Manufactured by the WATERTOWN STEAM BLOWER COMPANY.

H. E. PARSON, Supt., 42 PINE ST., N. Y.

THE CLERK GAS ENGINE.

Highest Award American Institute, New York, 1883. Silver Medal American Institute, N. Y., 1884.
Gold Medal Awarded Crystal Palace Electrical Exhibition, London, 1882.
Highest Award for Motive Power British Section International Exhibition of Electricity, Paris, 1881.

Reliable.

No Boiler.

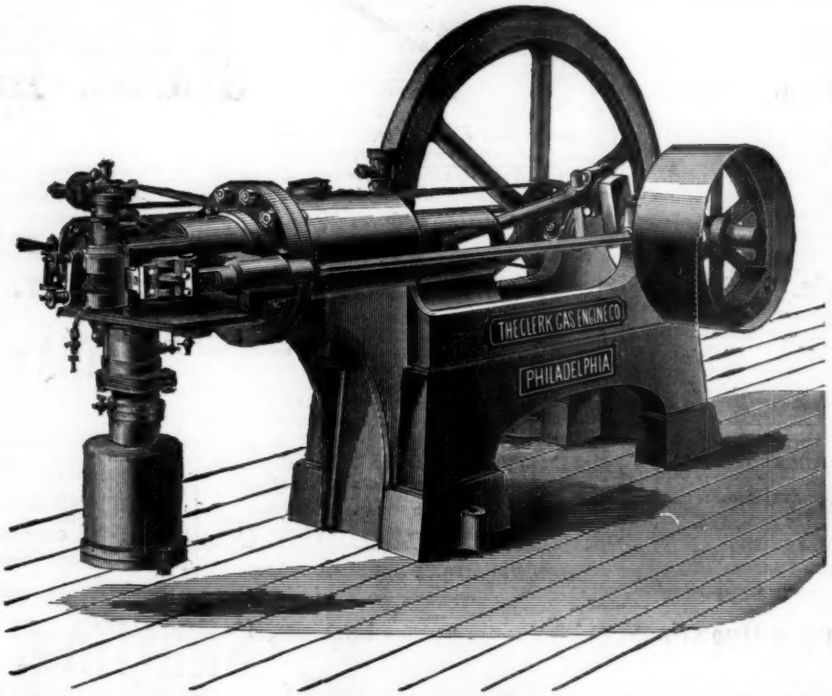
Steady.

No Coal.

Simple.

No Ashes.

Compact.



Economical.

No Engineer.

No Explosion

No Gearing Wheels.

No Danger.

No Parts requiring frequent renewal.

REQUIRING ONLY A MATCH TO START IT--GIVING ITS FULL POWER IMMEDIATELY.

We would inform the public that during the last few months we have improved THE CLERK GAS ENGINE to such an extent that we can now offer an engine vastly superior to our former pattern. These improvements have enabled us to sell our engine at a GREATLY REDUCED FIGURE, partly on account of the decreased weight (our engine weighing about half that of others giving the same Brake H. P). The consumption of gas has been decreased to a considerable extent, and the Brake H. P. has been increased some 25 to 30 per cent. All parts of the old design that were considered defective have been remodeled and new designs added. We now have an engine second to none as regards power, consumption, and ease of working. With our new engine all trouble in starting has been removed, the noise reduced to a minimum, and the regularity of motion is now all that can be desired. We guarantee all we claim for it, and the material and workmanship being of the best, enables us to guarantee the engine for twelve months.

SOLE MAKERS,

THE CLERK GAS ENGINE CO.,

WM. W. GOODWIN, President. E. STEIN, Secretary. S. LEWIS JONES, Asst. Secretary. L. P. GARRET, Supt.

Main Office, 1012-1018 Filbert Street, Philadelphia, Pa.

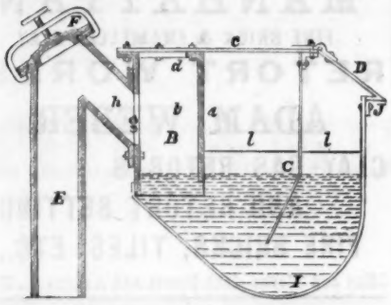
BRANCH OFFICES,

142 Chambers St., N. Y. 4 West Fourteenth St., N. Y. 76 Dearborn St., Chicago

General Agents,

THE GOODWIN GAS STOVE & METER CO.

Of Philadelphia, New York, and Chicago.

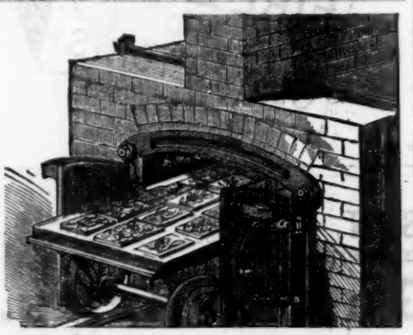


Boardman Hydraulic Main,

Patented October 7, 1884.

For description, see AM. GAS LIGHT JOURNAL of Feb. 2, 1884.
For terms, apply to

A. E. BOARDMAN, Macon, Ga.



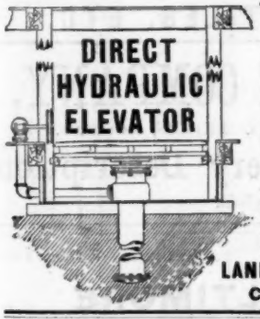
Glass-Staining Gas Kiln.

BAKERS' & CONFECTIONERS' OVENS (PAT.)

Thompson Gas Kiln & Oven Co.

59 Carmine St., N. Y.

Send for Circular by mail.



With Iron or Wood Platform.

Largely used by Leading Gas Co.s for Coal and Coke Lifts.

Adapted for use with city service, or special pumping and accumulator system. For prices address the

LANE & BODLEY CO., Cincinnati, O.

Iron Sponge,

GAS EXHAUSTERS,

AUTOMATIC GAS GOVERNORS,

CONNELLY & CO., Limited,

No. 407 BROADWAY, NEW YORK CITY.

JOS. R. THOMAS, C.E.,

May be Consulted on all Matters Relating to Gas Works and Gas Manufacture.

ADDRESS THIS OFFICE.

C. BARCALOW, PREST. J. V. BARCALOW, SEC. & TREAS.

BARTLETT
Street Lamp Mfg. Co.

MANUFACTURERS OF

Bartlett's Patent

GLOBE LAMPS.

FOR

Streets, Parks, Railroad Stations, Public Buildings, Etc.

LAMP POSTS A SPECIALTY.

Office and Salesroom,

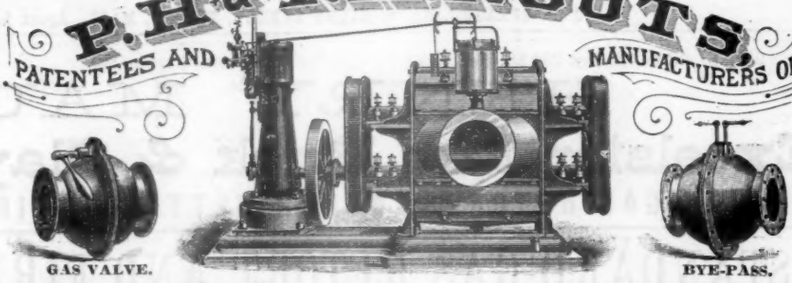
No. 35 Howard Street, N. Y. City.

Gas Companies and others intending to erect lamps and posts will do well to communicate with us.

F. M. ROOTS. S. C. ROOTS D. T. ROOTS.

P. H. & F. M. ROOTS,

PATENTEES AND MANUFACTURERS OF



GAS VALVE. BYE-PASS.

IMPROVED GAS EXHAUSTER,

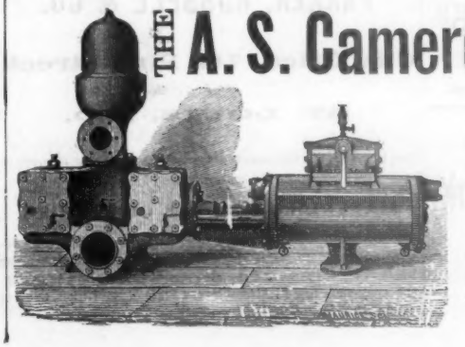
WITH ENGINE ON SAME BED PLATE, OR WITHOUT.

BYE-PASSES, GAS VALVES, GOVERNORS, ELBOWS, PIPE-FITTINGS, Etc., FURNISHED TO ORDER,

P. H. & F. M. ROOTS, Patentees & Manufacturers, **CONNERSVILLE, IND.**

S. S. TOWNSEND, General Agent, 22 Cortland St. and 9 Dey St., N. Y.
JAS. BEGGS & CO., Selling Agents, 9 Dey St., N. Y.
COOKE & CO., Selling Agents, 22 Cortland St., N. Y.

SEND FOR ILLUSTRATED CATALOGUE AND PRICE LIST.



THE A. S. Cameron Steam Pump,

THE STANDARD OF EXCELLENCE.

Upward of 30,000 in Use.

BEST GAS WORKS PUMP
Ever Introduced.

Adapted to Every Possible Duty.

A. S. Cameron Steam Pump Works,

Foot East 23d St., N. Y.

J. H. CAUTIER & CO.,
CORNER OF
GREENE AND ESSEX STREETS,
JERSEY CITY, N. J.
MANUFACTURERS OF
Clay Gas Retorts,
Gas House Tiles,
Fire Bricks, Etc. Etc.
Ground Clay, Fire Brick and Fire Sand in Barrels.
J. H. GAUTIER. T. B. GAUTIER.
C. E. GREGORY. C. E. GAUTIER.

BROOKLYN
Clay Retort & Fire Brick Works,
(EDWARD D. WHITE & CO.)
Manufacturers of Clay Retorts, Fire Brick, Gas House and other Tile.
VAN DYKE, ELIZABETH, RICHARDS & PARTITION STS.
Office, 88 Van Dyke St., Brooklyn, N. Y.

LACLEDE FIRE BRICK MFG. CO.,
MANUFACTURERS OF
Fire Brick, Gas Retorts,
AND
ST. LOUIS STANDARD SEWER PIPE.
Blast Furnace and Cupola Linings, every description of Fire Clay Material, Fire Clay Flue Linings, Chimney Tops Dry Milled and Crude Fire Clays, etc.
OFFICE AND DEPOT
901, 903, and 905 Pine Street,
ST. LOUIS, MO.

ESTABLISHED IN 1845.
B. KREISCHER & SONS,
OFFICE FOOT OF HOUSTON ST., E.R., N.Y.
Gas Retorts,
TILES, FIRE BRICK.
AND EVERYTHING IN THE FIRE CLAY LINE.

MANHATTAN
FIRE BRICK & ENAMELLED CLAY
RETORT WORKS.
ADAM WEBER.
CLAY GAS RETORTS
AND RETORT SETTINGS
FIRE BRICKS, TILES, ETC.,
Office and Works, 15th Street and Avenue C., N. Y.

JAMES GARDNER, JR.
Works,
LOCKPORT STATION, PA.
—ESTABLISHED 1864.—
WILLIAM GARDNER & SON,
Successor to GARDNER BROTHERS.
WILLIAM GARDNER.
Office, COAL EXCHANGE,
PITTSBURGH, PA. P. O. Box 373.
Fire Clay Goods for Gas Works.
C. H. SPRAGUE, No. 70 KILBY STREET, BOSTON, MASS., Agent for the New England States.

OFFICE, 418 to 422 East 23d St., New York. ESTABLISHED 1856. WORKS, PERTH AMBOY, NEW JERSEY.
HENRY MAURER,
Excelsior Fire Brick & Clay Retort Works
CLAY GAS RETORTS, BENCH SETTINGS, FIRE BRICK, TILES, ETC.

STANDARD GAS RETORT AND FIRE BRICK COMPANY,
J. ANDERSON, PRES. & MANG'R. OF IRONTON, OHIO. C. PETERS, SECRETARY.
Clay Gas Retorts, Fire Brick, and Fire Clay Goods of Every Description.
Plans of Livesey-Somerville, McIlhenny, and other Furnaces, and Competent Workmen Supplied.

CHICAGO
Retort & Fire Brick Works,
OFFICE AND FACTORY,
Clark, Forty-Fifth, and La Salle Streets,
CHICAGO, ILL.
GEORGE C. HICKS, PRES. PAUL P. AUSTIN, SEC. & TREAS.
STANDARD
Clay Retorts and Settings.
BLOCKS & TILES
of every Shape and Size to Order.
Standard Fire Bricks.

NEWBIGGING'S
Gas Manager's Handbook.
Price, $4.80.
EVERY GAS MAN SHOULD HAVE ONE.
Orders may be sent to this Office.

OAKHILL
GAS RETORT & FIRE BRICK
COMPANY.
PARKER, RUSSELL & CO.
City Office, 711 Pine Street,
ST. LOUIS, MO.
Our immense establishment is now employed almost entirely in the manufacture of
MATERIALS FOR GAS COMPANIES.
We have studied and perfected three important points. Our retorts are made to stand changes of temperature, the strongest heats of the furnace, and the abrasion of feeding and emptying. Our customers are in almost every State of the Union, to all of whom we refer.

THOS. SMITH, Prest. AUGUST LAMBLA, Vice-Prest. & Sup
BALTIMORE
RETORT & FIRE BRICK CO.
MANUFACTORY AT
LOCUST POINT, BALTIMORE, MD.
Connection with the City by Telephone.
Clay Retorts, Blocks & Tiles,
FIRE BRICK, FIRE CLAY,
AND FIRE CEMENT.
Red and Buff Ornamental Tiles and Chimney Tops. Drain and Sewer Pipe (from 2 to 30 inches). Baker Oven Tiles 12x12x2 and 10x10x2.
WALDO BROS., 88 WATER ST., BOSTON, MASS
Sole Agents for New England States

THE AMERICAN METER CO.,

Large Flat Flame Burners.
15 cts. each, $1.50 per doz.

A test with these burners, with 18-can. gas, gives the following results:

No.	Pressure.	Consump. per Hr	Candle Power
		Cu. Ft.	
20	1.00 in.	7.75	33.00
30	1.00 in.	9.90	42.50
40	0.85 in.	10.20	44.54
60	.....	.....	.....

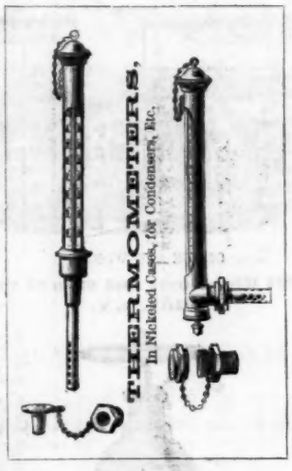
BURNER, by use of which Gasoline Stove is changed to Gas Stove.

Gasoline Stove.

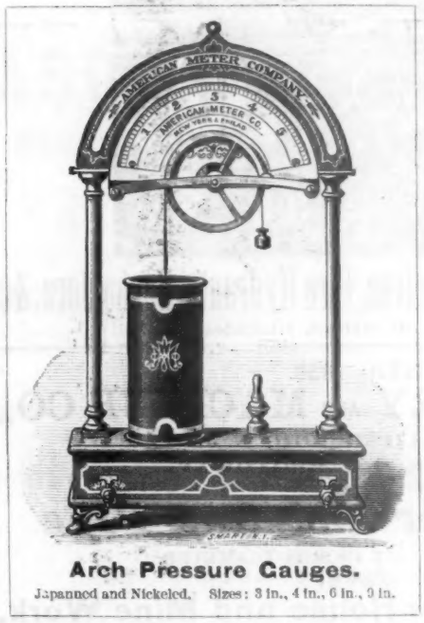
MANUFACTORIES,

508 to 514 West Twenty-second St., N. Y. **Arch and Twenty-second St., Phila.**

Nos. 244 & 246 North Wells Street, Chicago, Ill.



THERMOMETERS,
In Nickeled Cases, for Condensers, Etc.



Arch Pressure Gauges.
Japanned and Nickeled. Sizes: 3 in., 4 in., 6 in., 9 in.

SIPHON
Pressure Gauges.

4 inch,	Nickeled.
6 inch,	"
8 inch,	"
10 inch,	"
12 inch,	"
14 inch,	"
16 inch,	"
18 inch,	"
20 inch,	"
24 inch,	"

AGENCIES,

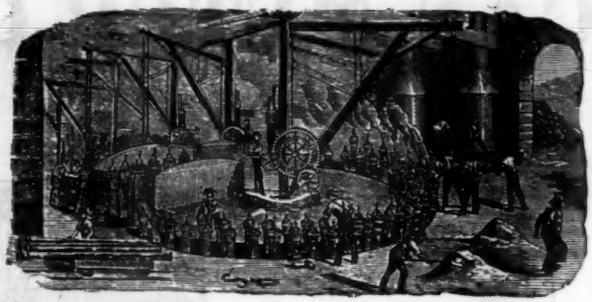
No. 177 Elm Street, Cincinnati, Ohio. Nos. 122 & 124 Sutter Street, San Francisco Cal.

No. 810 North Second Street, St. Louis, Mo.

A. H. M'NEAL,

BURLINGTON, N. J.

Flange-Pipes



General Foundry Work.

CAST IRON PIPES

FOR WATER AND GAS.

JAMES S. MOORE, Pres. BENJAMIN CHEW, Treas. JAS. P. MICHELLON, Sec. WM. SEXTON, Supt.

GLOUCESTER IRON WORKS,

GLOUCESTER CITY, N. J.

Cast Iron Gas & Water Pipes, Stop Valves, Fire Hydrants, Gasholders. &c.

Office No. 6 North Seventh Street, Philadelphia.

ESTABLISHED 1856.

WARREN FOUNDRY AND MACHINE CO.,

WORKS AT PHILLIPSBURGH, N. J.

NEW YORK OFFICE, 162 BROADWAY.

Cast Iron Water and Gas Pipe

FROM TWO TO FORTY-EIGHT INCHES DIAMETER.

ALSO ALL SIZES OF

FLANGE PIPE for Sugar House and Mine Work.

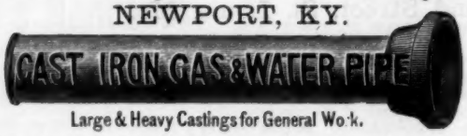
Branches, Bends, Retorts, Etc., Etc. 436-1

MATTHEW ADDY, President. W. L. DAVIS, Selling Agent. GEO. P. WILSHIRE, Sec. & Treas.

Cincinnati and Newport Iron and Pipe Company,

NEWPORT, KY.

Lamp Posts AND **BENCH CASTINGS** A Specialty.



Large & Heavy Castings for General Work.

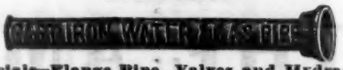
Branch AND SPECIAL CASTINGS FOR GAS & WATER Co's.

Manufacture Pipe from 2 to 48 inches. All work guaranteed first quality.

Mellert Foundry and Machine Co.

Limited. Established 1848.

MANUFACTURERS OF



Specials—Flange Pipe, Valves and Hydrants, Lamp Posts, Retorts, etc.

Machinery and castings for Furnaces, Rolling Mills, Grist and Saw Mills, Mining Pumps, Hoists, etc.

GENERAL OFFICE, - - - READING, PA.

CAST IRON Gas and Water Pipes,

From 2 to 48 Inches in Diameter.

FOX & DRUMMOND,

160 Broadway, N. Y. City.

THE OHIO PIPE COMPANY,

MANUFACTURERS OF

Cast Iron Gas & Water Pipe,

BRANCH AND SPECIAL CASTINGS.

Gas-House Bench Castings, Hydraulics, Lamp Posts, Flange Pipe and Specials, Architectural Castings, Building Columns, Joists, Cellar Grates, Sash Weights, etc.

GENERAL FOUNDERS AND MACHINISTS.

Columbus, Ohio.

LUDLOW VALVE MFG. CO.

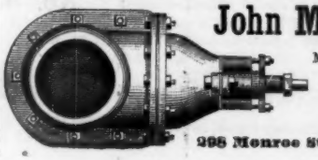
OFFICE AND WORKS,

938 to 954 River Street and 67 to 83 Vail Av.

TROY, N. Y.

Hydraulic Main Dip Regulators, also Check Valves, Foot Valves, Yard-wash and Fire Hydrants. Send for Circulars.

Valves.—Double and Single Gate, ¾ in. to 48 in., outside and inside Screws. Indicator, etc., for Gas, Water, Steam, and Oil. nd for Circulars.



John McLean

Man'facturer of

GAS VALVES.

298 Monroe Street, N. Y.

Siemens's Regenerative Gas Burners,

For Lighting and Ventilating.

THE CHEAPEST, PUREST, AND MOST BRILLIANT OF ALL GAS LIGHTS.

Superior to the Electric Light in Economy, Beauty, & Steadiness.

SPECIALLY ADAPTED FOR LIGHTING HALLS, FACTORIES, OPEN SPACES, ETC.

Numerous Tests made by various Gas Companies in the United States show an Efficiency of Ten Candle Power per Cubic Foot of Gas.

General Agents:

SIEMENS LIGHTING CO., 347 West Main St., Louisville, Ky.
MEYER, MARSHALL & CO., 528 California St., San Francisco.
DENNEHY, WOLF & O'BRIEN, 85 & 87 Dearborn St. Chicago, Ill.
WILCOX & McCEARY, - No. 11 Bissel Block, Pittsburgh, Pa.
T. T. RAMSDELL & CO., - 20 Swan Street, Buffalo, N. Y.
SIEMENS GAS ILLUMINATING CO., Room 6, No. 157 Broadway, New York City.
W. D. COLT, - - - - 1420 F Street, Washington, D. C.
JOHN KIEFER, - - - 344 Lawrence, Street, Denver, Col.

THE SIEMENS REGENERATIVE GAS LAMP COMPANY,

SOLE MAKERS FOR THE UNITED STATES,

N. E. Cor. 21st. St. and Washington Av., Philadelphia, Pa.

THE "STANDARD" WASHER-SCRUBBER,

KIRKHAM, HULETT & CHANDLER'S PATENT.

Total Capacity per 24 Hours of "Standard" Washers Ordered During the Following Years.

1877	4,000,000 cubic feet.
1878	4,750,000 "
1879	24,545,000 "
1880	42,907,500 "
1881	36,462,500 "
1882	39,800,000 "
1883	57,735,000 "
1884	26,177,500 "
Total	235,937,500 cubic feet.

Total Number and Capacity per 24 Hours of "Standard" Washers Erected and in Course of Erection in the Several Countries

	Number.	Cubic Feet per Day.
Great Britain	151	157,070,000
Western Hemisphere	38	39,337,500
Australia	18	12,150,000
New Zealand	2	650,000
France	6	4,550,000
Belgium	8	5,420,000
Germany	16	8,200,000
Holland	4	4,160,000
Denmark	1	150,000
Russia	2	3,500,000
Spain	1	350,000
India	1	400,000
Total	248	235,937,500

THE CONTINUED POPULARITY
Of these Machines

Will be recognized from the following extracts from letters from representatives of some of the companies having them in use:

PROVIDENCE GAS COMPANY,
PROVIDENCE, R. I., Nov. 24, 1884.

GEO. SHEPARD PAGE, Esq., New York:

Dear Sir—We are now using less than a gallon of water per thousand in the "Standard," and the gas at the outlet will not color turmeric paper.

Yours etc.,
A. B. SLATER, Treasurer.

PORTLAND GAS COMPANY.
PORTLAND, ORE., Nov. 29, 1884.

GEO. SHEPERD PAGE, New York:

Dear Sir—Our Scrubber appears to run to our entire satisfaction, and we are pleased to say that it takes out all the ammonia from the gas. This is *very* satisfactory to us, as we were ruining our meters at a fearful rate heretofore. The amount of water used is very inconsiderable as compared with our old process. The machine runs very smooth and still.

Very respectfully,
H. C. LEONARD, Secretary.

"Standard" Washers Ordered Recently.

	Cu. Ft. per Day
Anneberg Gas Co	200,000
Bombay Gas Co	400,000
Brussels Co	1,250,000
CHICAGO, two, 1,000,000 each	2,000,000
Chemnitz Gas Co	1,000,000
CITIZENS GAS CO., BUFFALO	750,000
Coke Works in Zabre, Ober-Schlesien	1,500,00
Cokerei der Friedenshutte, Upper Silesia	100,000
Dumfries Corporation	250,000
Dunedin Gas Co., New Zealand	400,000
GEORGETOWN, D. C	250,000
King's Lynn Gas Co	300,000
Leiden, Holland	000,000
Lincoln Gas Co	400,000
Liverpool Gas Co	2,000,000
" "	3,000,000
LOUISVILLE GAS CO	1,500,000
Numea Gas Co	100,000
PITTSBURGH GAS CO	1,500,000
PAWTUCKET, R. I	500,000
PORTLAND GAS CO., Oregon	562,500
SAN FRANCISCO GAS CO	4,000,000
Sheepbridge	40,000
ST. LOUIS GAS CO	2,000,000
Sydney Gas Co	2,500,000
WASHINGTON, D. C. GAS CO	2,000,000
Whitchurch Gas Co	175,000
Total	29,677,500

GEO. SHEPARD PAGE, No. 69 WALL STREET, NEW YORK,

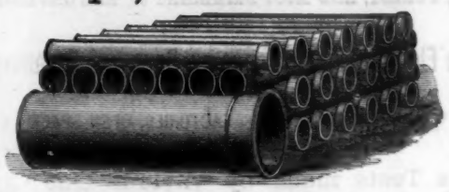
SOLE AGENT FOR THE WESTERN HEMISPHERE.

R. D. WOOD & CO.,

400 Chestnut Street, Phila., Pa.

Cast Iron Gas & Water Pipe, Water Machinery & Gas Apparatus

Cast Iron Pipe, Fire Hydrants, Eddy Valves, Lamp Posts, Large Loam Castings, Flanged Pipe, Sugar House Work, Iron Roofs and Floors, Wrought & Cast Iron Tanks, Turbine Water Wheels and Pumps.



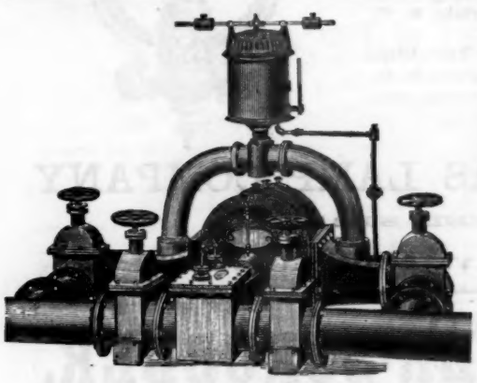
Gasholders, Lime Trays, Center Valves, Purifiers, Bench Work, Exhausters, Condensers, Governors, Scrubbers, Gas Valves Station Meters, Cast Iron Pipe Fittings.

Manufacturers of Heavy Castings and Machinery of Every Description.

ENGINEERS & CONTRACTORS FOR THE ERECTION OF GAS WORKS, & ALL MACHINERY CONNECTED THEREWITH

Estimates and specifications furnished for erection of new works or the extension or alteration of old ones.

Foundries and Works, - - Millville, Florence, and Camden, N. J.



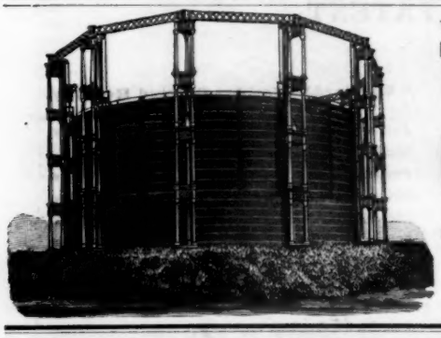
SMITH & SAYRE MFG. COMPANY,

G. G. PORTER, Prest. *245 Broadway, N. Y.* CHAS. W. ISBELL, Sec'y.

Machinery & Apparatus for Gas Works

Drawings, Plans, and Estimates Furnished for the Improvement, Extension, or Alteration of Gas Works, or for the Construction of New Works.

Mackenzie's Patent Rotary and Steam Jet Gas Exhausters, Governors, Compensators, Condensers, Washers, Scrubbers. Isbell's Patent Automatic Street Pressure Governor, Gas and Water Valves, Hydraulic Main Dip Regulator, Bench Castings, etc. Purifying Boxes and "Standard" Scrubbers. Isbell's Patent Self-Sealing Retort Doors.



W. E. Tanner, Pres., W. R. Trigg, V.-Pres., A. Delaney, Supt.

Tanner & Delaney Engine Co.

RICHMOND, VA.

Gas Apparatus,

INCLUDING

Condensers of various styles, Scrubbers, Holders, Purifiers, Castings for Retort Houses, Etc.

ALSO STEAM ENGINES AND BOILERS.

Plans, Specifications and Estimates Furnished.

SOUTHWARK FOUNDRY AND MACHINE COMPANY,

Successors to MERRICK & SONS. Established in 1836.

No. 430 Washington Avenue, Philadelphia, Pa.

MANUFACTURERS OF

Single and Telescopic Gasholders,

BENCH CASTINGS,

Washers, Scrubbers, Condensers, Purifiers,

And all apparatus necessary for the construction of improved new gas works and in the extension of established works. Also manufacturers of

Gas Engines, and of all descriptions of Steam and Hydraulic Machinery, and of Boiler and Tank Work.

Plans, specifications, and estimates furnished promptly on application.

MORRIS, TASKER & CO.,

Limited,

Builders of Gas Works,

PHILADELPHIA, PA.

To Gas Companies.

We make to order **CAP BURNERS** to burn any amount under a stated pressure. Send for samples.

Also, SERVICE CLEANERS, DRIP PUMPS, and STREET MAIN PROVING APPARATUS.

C. A. GEFRORER,

248 N. 8th Street, Phila., Pa.

WM. HENRY WHITE,

Consulting & Constructing

Gas Engineer & Contractor.

ESTIMATES, PLANS, AND SPECIFICATIONS FURNISHED FOR NEW WORKS OR EXTENSIONS OF EXISTING WORKS.

32 Pine St., New York City.

Correspondence solicited.

KERR MURRAY MFG. CO.,

MANUFACTURERS OF

Single Lift and Telescopic

GASHOLDERS.

Built, 1884:

Altoona, Pa	Capacity,	160,000	cubic feet.
Pittsburgh, Pa	"	250,000	"
" "	"	230,000	"
Bellaire, Ohio	"	50,000	"
Youngstown, Ohio	"	60,000	"
Canton, "	"	60,000	"
Akron, "	"	80,000	"
Xenia, "	"	10,000	"
Adrian, Mich	"	65,000	"
Ypsilanti, Mich	"	25,000	"
Muskegon, "	"	70,000	"
South Bend, Ind	"	70,000	"
Anderson, "	"	20,000	"
Plainfield, "	"	10,000	"
Springfield, Illinois	"	100,000	"
Evanston, "	"	50,000	"
Freeport, "	"	35,000	"
Elgin, "	"	60,000	"
Sheboygan Wis	"	20,000	"
Key West Fla	"	10,000	"

Plans and estimates furnished for the erection of new and the rebuilding of old works. Address

Kerr Murray Mfg. Co.,

FORT WAYNE, IND.

JAMES R. FLOYD,

(SUCCESSOR TO HERRING & FLOYD)

Oregon Iron Works,

531 to 543 West 20th St., N. Y.

Practical Builders of Gas Works,

MANUFACTURERS OF

ALL KINDS OF CASTINGS
AND
APPARATUS FOR GAS-WORKS.

BENCH CASTINGS
from benches of one to six Retorts each.
WASHERS: MULTITUBLAR AND AIR CONDENSERS; CONDENSERS; SCRUBBERS
wet and dry), and
EXHAUSTERS
for relieving Retorts from pressure.
BENDS and BRANCHES
of all sizes and description.
FLOYD'S PATENT MALLEABLE RETORT LID.
PATENT SELF-SEALING RETORT LIDS.
FARMER'S PATENT BYE-PASS DIP-PIPE.
SABBATON'S PATENT FURNACE DOOR AND FRAME.
BUTLER'S COKE SCREENING SHOVELS.

GAS GOVERNORS,

and everything connected with well regulated Gas Works at low price, and in complete order.

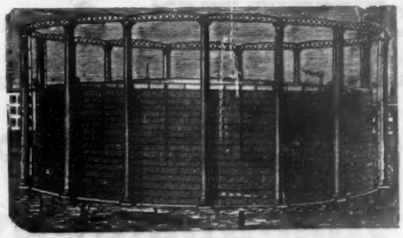
SELLER'S CEMENT

for stopping leaks in Retorts.

N. B.—**STOP VALVES** from three to thirty inches—at very low prices.

Plans, Specifications, and Estimates furnished.

CONTINENTAL WORKS.



GASHOLDERS OF ANY MAGNITUDE.

T. F. ROWLAND, Proprietor,
GREENPOINT, BROOKLYN, N. Y.
ENGINEER AND MANUFACTURER OF
GAS-HOLDERS.
CONDENSERS, SCRUBBERS, VALVES, PURIFIERS, RETORTS, and HYDRAULIC MAINS,
and all other articles connected with the Manufacture and Distribution of Gas. Plans and Specifications prepared and Proposals given for the necessary Plant for Lighting Cities, Towns, Mansions, and Manufactories.

H. RANSHAW, Prest. & Mangr. WM. STACEY, Vice-Pres. T. H. BIRCH, Asst. Mangr. R. J. TARVIN, Sec. & Treas.

STACEY MFG. CO.,

MANUFACTURERS OF

Single and Telescopic Gasholders,

IRON ROOFS, BRIDGES, LAMP POSTS,

Water and Oil Tanks, Coal Elevator Cars,

COKE CRUSHERS, BENCH CASTINGS,

And all kinds of Wrought and Cast Iron Work used in the erection of Coal and Oil Gas Works. Rolling Mill Machinery and Heavy Castings a Specialty.

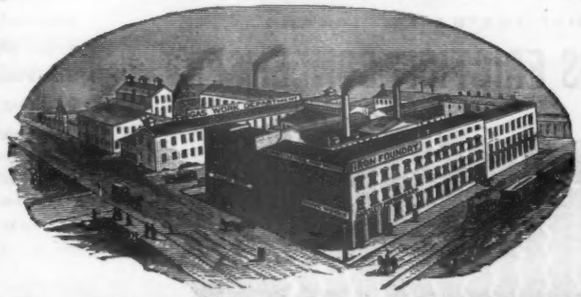
Foundry: 33, 35, 37 & 39 Mill Street. **Wrought Iron Works:** 16, 18, 20, 22, 24 & 26 Ramsey Street.

Cincinnati, Ohio.

BARTLETT, HAYWARD & CO.,

Office, 24 Light. **BALTIMORE, MD.** Works, Pratt &

PURIFIERS. Roofs. Bench Castings.



SCRUBBERS. BOILERS. CONDENSERS.

GASHOLDERS.

CONSTRUCTING ENGINEERS AND BUILDERS OF GAS WORKS.

1842. DEILY & FOWLER, 1885.

Laurel Iron Works.

Address, No. 39 Laurel Street, Philadelphia, Pa.

MANUFACTURERS OF

GASHOLDERS,

Single or Telescopic, with Cast or Wrought Iron Guide Frames.

Holders Built Since 1880:

Mount Joy, Pa.
Rockaway B'ch, N.Y. (2)
Zanesville, O. (2d.)
Lancaster, O.
Blackwell's Island N. Y.
Waltham, Mass., (1st.)
Dorchester, Mass.
Wheeling, West Va.
Lansing, Mich.
Flint, Mich.
Galveston, Texas (1st.)
Milton, Pa.
Scranton, Pa.
West Point, N. Y.
Fitchburgh, Mass.
New London, Conn.
Derby, Conn.
Bridgeport, Conn.
Allegheny, Pa. (1st.)
St. Hyacinth, Can.
Norwalk, O.
Brattleboro, V
Waltham, Mass (2d.)
West Chester, Pa.
Baltimore, Md.
Hollidaysburg, Pa.
Galveston, Texas (2d.)
Marlboro, Mass.
Denver, Col.
Chicago, Ill. (West Side).
Pittsburgh, Pa. (S. Side).
Pawtucket, R. I.
Brookline, Mass.
Sherbrooke, Can.
Burlington, N. J. (2d.)
Bridgeton, N. J.
Bay City, Mich.
Erie, Pa.
Jackson, Mich.
Kalamazoo, Mich. (2d.)
Glen Island, N. Y.
Warren, Ohio.
Bath, N. Y.
Lynn, Mass.
New Bedford, Mass.
Waterbury, Conn.
Deseronto, Can.
Hoosic Falls, N. Y. (2d.)
Bethlehem, Pa.
Atlanta, Ga. (1st.)
Savannah, Ga.
Montgomery, Ala
Newport, R. I.
Portland, Oregon.
Allegheny, Pa. (2d.)
Atlanta, Ga. (2d.)
N.Y.City (Central Ga.)
Lynchburg, Va. (2d.)
Saylesville, R. I.
Rondout, N. Y.
Atlantic City, N. J.
Augusta, Ga.
Waltham, Mass. (2)

GAS COALS. GAS COALS. GAS COALS.

JAMES D. PERKINS. **PERKINS & CO.,** F. SEAVERNS.

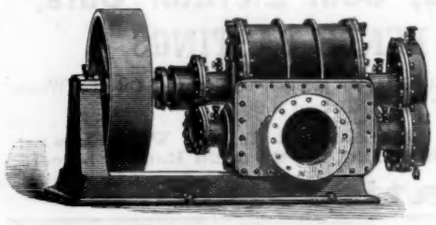
General Sales Agents for

The Youghiogheny River Coal Company's

OCEAN MINE YOUGHIOGHENY GAS COAL.

The Coal from the Ocean Mine (recently operated by Messrs. W. L. Scott & Co., of Erie, Pa.,) is now used by all the leading Gas Companies in the United States from Maine to Texas, and is recognized as *the only reliable Youghiogheny Gas Coal.* (See Map on p. 87 of this Journal, Feb. 16, 1885.)

P. O. Box 3695, New York. **PERKINS & CO., 228 and 229 N. Y. Produce Exchange** BEAVER STREET ENTRANCE.



Gas Exhauster Driven by Belt.

The Wilbraham Gas Exhauster,

"BAKER SYSTEM,"

WITH ENGINE ATTACHED, ON SAME BED PLATE OR WITHOUT.

Best, Cheapest and Most Durable Exhauster known.

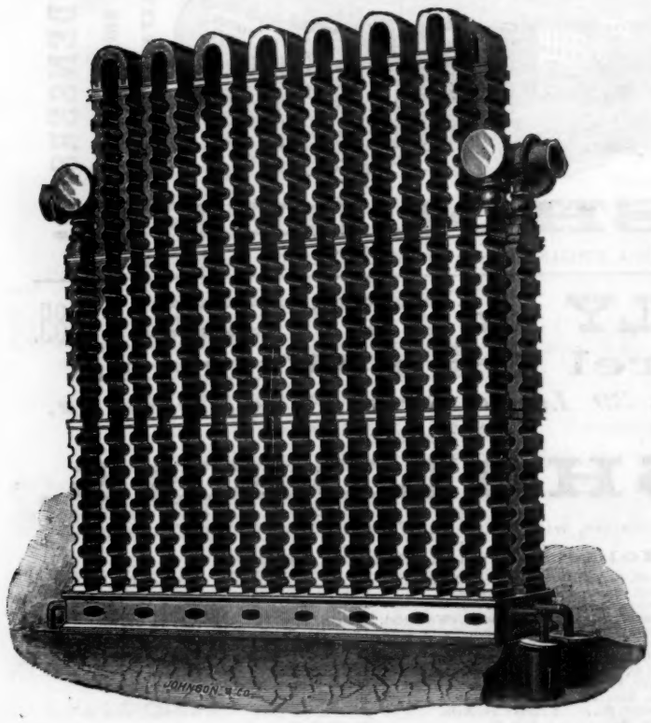
WILBRAHAM BROS.,

No. 2320 Frankford Avenue, Philadelphia, Pa.

F. J. DAVIS & J. R. FARNUM,

TRUSTEES AND AGENTS FOR THE

SINUOUS FRICTION CONDENSER.



We desire to draw the attention of the gas community to the merits of the SINUOUS FRICTION CONDENSER. Companies intending to introduce new condensers into their works will do well to confer with us and examine plans and estimates before contracting for any other pattern The FRICTION CONDENSER is now in use at the gas works located in the following places:

Portland, Me.	Brookline, Mass.	Pawtucket, R. I.	Fredericton, N. B.
Newport, R. I.	Chelsea, Mass.	Jamaica Plain, Mass.	St. John, N. B.
Gloucester, Mass.	Woburn, Mass.	Attleboro, Mass.	Paterson, N. J.
Newton & Watertown, Mass.	Peoria, Ill.	Calais, Me.	Dover, N. H.
	Clinton, Mass.	Fall River, Mass.	Waltham, Mass,
	Nassau Works, Brooklyn, N. Y.		

DAVIS & FARNUM MFG. CO.

MANUFACTURERS OF

Gas and Water Pipes,

AND

GAS AND WATER MACHINERY

OF THE MOST APPROVED PATTERN.

Also, Gasholders and Iron Roofing.

Orders from Gas and Water Companies promptly attended to.

WALTHAM, MASS.

Boston Office, Room 55, Mason Building, 70 Kilby Street.

GAS COALS. GAS COALS. GAS COALS,

Newburgh Orrel Coal Co.,

MINERS AND SHIPPERS OF

Newburgh Orrel, Tyrconnell and Palatine Gas Coals.

ALSO SHIPPERS OF FOUNDRY COKE.

Mines Situated at

Newburgh, Flemington & Fairmont, W.Va.

HOME OFFICE,

25 S. Gay St., Baltimore.

CHARLES MACKALL,
MANAGER.

CHAS. W. HAYS, Agent in New York,
Room 92, WASHINGTON BUILDING, No. 1 Broadway.

Shipping wharves at Locust Point. References furnished when required. Special attention given to chartering vessels.

THE DESPARD COAL COMPANY

OFFER THEIR SUPERIOR

DESPARD COAL

To Gas Light Companies and Manufacturers of Fire Clay Goods Throughout the Country.

ROUSSEL & HICKS, 71 Broadway, N. Y. } *AGENTS.* { BANGS & HORTON, 16 Kilby St., Boston.

Mines in Harrison Co., West Va. Wharves, Locust Point, Balt.

Company's Office, 15 German St., Baltimore, Md.

Among the consumers of Despard Coal we name: Manhattan Gas Light Co., N. Y.; Metropolitan Gas Light Co., N. Y.; Jersey City, (N. J.) Gas Light Co.; Washington (D. C.) Gas Light Co.; Portland (Maine) Gas Light Co. Reference to them is requested.

WELSH "ABERNANT"

Silica Dinas Fire Brick & Cement.

Unrivaled for Endurance Under Intense Heat. Percentage of Silica, 95.64.

Also SCOTCH "BLOCHAIRN" FIRE BRICK.

A. T. CHUR,

SOLE AGENT FOR THE UNITED STATES,

Mills Building, Room 14, Fifth Story, New York.

PRESERVE

The Journal

BY THE USE OF

THE STRAP FILE.

Advantages of the Strap File.

1st. It is simple, strong, and easily used.

2d. Preserves papers without punching holes.

3d. Will always lie flat open.

4th. Allows any paper on file to be taken off without disturbing the others.

Price, $1.25. Sent either by express or mail, as directed. By mail the postage will be 20 cents, which will be added to the price of the Binder.

A. M. CALLENDER & CO., 42 PINE ST., N. Y.

THE PENN GAS COAL CO.

OFFER THEIR

Coal, Carefully Screened & Prepared for Gas Purposes.

Their Property is located in the Youghiogheny Coal Basin, near Irwin and Penn Stations on the Pennsylvania Railroad, and on the Youghiogheny River.

Principal Office:

209 SOUTH THIRD STREET, PHILA., PA.

Points of Shipment:

Pennsylvania Railroad Piers; Greenwich Wharves, Delaware River; Pier No. 1 (Lower Side), South Amboy, N. J.

Chesapeake & Ohio Railway Coal Agency,

FOR THE SALE OF THE

Superior Kanawha Gas Coals, Cannelton Cannel,

Also, SPLINT AND STEAM COALS,

From the Kanawha and New River Regions, on the line of the Chesapeake & Ohio R'way.

C. B. ORCUTT, Sales Agent. | **OFFICE, 150 BROADWAY, N Y.**

FRANCIS H. JACKSON, PRESIDENT. EDMUND H. MCCULLOUGH, SEC. & TREAS.

THE WESTMORELAND COAL CO.

Chartered 1854.

Mines situated on the Pennsylvania and the Baltimore and Ohio Railroads, in Westmoreland County, Penn.

POINTS OF SHIPMENT:

PHILADELPHIA, BALTIMORE, SOUTH AMBOY, N. J.
WATKINS (SENECA LAKE), N. Y.

Since the commencement of operations by this Company its well-known Coal has been largely used by the Gas Companies of New England and the Middle States, and its character is established as having no superior in gas-giving qualities, and in freedom from sulphur and other impurities.

Principal Office, 224 South 3d St., Phila., Pa.

The Bower Gas Lamp.

The Perfected Duplex-Regenerative Gas Burner, under the combined Patents of Anthony S. Bower, Geo. S. Grimston, and Thos. Thorp.

The First Gold Medal awarded at the Crystal Palace Exhibition in London, and two Gold Medals at the Stockport (Eng.) Exhibition of Gas Appliances. Both in 1883.

GEO. SHEPARD PAGE, JOHN BOWER,
69 Wall Street, N. Y. City.

The Management of Small Gas Works.

By C. J. R. HUMPHREYS. Price, $1.

A. M. CALLENDER & CO., 42 Pine St., N. Y.

INTERNATIONAL--1876--EXHIBITION.

The U. S. Centennial Commission

HAVE DECREED AN AWARD TO

HARRIS, GRIFFIN & CO.,

Twelfth and Brown Streets, Philadelphia, Pa., No. 49 Dey Street, N. Y. City, and No. 75 North Clinton Street, Chicago, Ill.,

FOR THE FOLLOWING REASONS:

The Exhibit consists of a Series of METERS from the Largest Size Station Meters for the use of the MANUFACTURE OF GAS, to those for the use of the ORDINARY CONSUMER. The Instruments are WELL MADE, RELIABLE as to INDICATION, and embody a number of sundry improvements which, with the general character of the Exhibit, entitle the whole to commendation.

Attest—J. L. CAMPBELL, Secretary, pro-tem. Signed—A. T. GOSHORN, Director General J. R. HAWLEY, President.

CHARLES E. DICKEY. JAMES B. SMALLWOOD. CHARLES H. DICKEY.

Maryland Meter and Manufacturing Co.,

DICKEY, TANSLEY & CO.,

Established 1866.

Nos. 22 and 24 Saratoga Street, Baltimore, Md.
No. 46 La Salle St., Chicago, Ill.

MANUFACTURERS OF

DRY GAS METERS, STATION METERS, GLAZED METERS, TEST METERS, METER PROVERS, PRESSURE AND VACUUM REGISTERS, GOVERNORS, INDICATORS, SERVICE AND METER COCKS, AND METER CONNECTIONS.

Dry Gas Meter.

With 39 years' experience and the best facilities for manufacturing, is enabled to furnish reliable work and answer orders promptly.

NATHANIEL TUFTS,

No. 153 Franklin Street, Boston, Mass.,

MANUFACTURER OF

DRY GAS METERS.

Station Meters of any Capacity.

Test and Experimental Meters, Pressure Registers, Pressure Gauges, Pressure and Vacuum Gauges.

METER PROVERS, PHOTOMETERS, STREET LANTERNS, ETC., ETC.

Patent Cluster Lanterns for Street Illumination.

SCIENTIFIC BOOKS.

We are prepared to furnish to Gas Managers, and others interested in the topics treated of, the following books, at prices named:

KING'S TREATISE ON THE MANUFACTURE OF COAL GAS. Three vols.; $10 per vol.

GAS MANUFACTURE, by WILLIAM RICHARDS. 4to., with numerous Engravings and Plates, in Cloth binding. $12.

THE GAS ANALYST'S MANUAL, by F. W. HARTLEY. $2.50.

ANALYSIS, TECHNICAL VALUATION, PURIFICATION, and USE OF COAL GAS, by REV. W. R. BOWDITCH, M.A.; with Engravings; 8vo., Cloth. $4 50.

GAS MEASUREMENT AND GAS METER TESTING by F. W. HARTLEY. $1.60

GAS CONSUMER'S HANDBOOK, by WILLIAM RICHARDS, C.E.; 18mo., Sewed. 20 cents.

GAS CONSUMER'S MANUAL, by E. S. CATHELS, C.E. 10 cts.

PRACTICAL TREATISE ON HEAT, by THOMAS BOX. Second edition. $5.

GAS WORKS—THEIR ARRANGEMENT, CONSTRUCTION, PLANT, AND MACHINERY. $8.

COAL; ITS HISTORY AND USE, by PROF. THORPE. $3.50.

THE GAS WORKS OF LONDON, by COLBURN. 60 cents.

THE GAS FITTER'S GUIDE, Showing the Principles and Practice of Lighting with Coal Gas, by JOHN ELDREDGE. 40 cents.

GAS WORKS, AND MANUFACTURING COAL GAS, HUGHES. $2.20.

THE MANAGEMENT OF SMALL GAS WORKS, by C. J. B. HUMPHREYS. $1.

A PRACTICAL TREATISE ON GAS AND VENTILATION with Special Relation to Illuminating, Heating, and Cooking by Gas, by E. E. PERKINS. $1.25.

PURIFICATION OF COAL GAS, by R. P. SPICE. 8vo. $3.

HOW TO MANAGE GAS, by F. WILKINS. Paper. 30 cents.

THE GAS MANAGER IN THE LABORATORY, by a Practical Student. 8vo., Cloth. $1.50.

THE DOMESTIC USES OF COAL GAS, AS APPLIED TO LIGHTING, by W. SUGG. $1.40.

DISTILLATION OF COAL TAR AND AMMONIACAL LIQUOR, by GEO. LUNGE. $8.50.

A TREATISE ON THE COMPARATIVE COMMERCIAL VALUES OF GAS COALS AND CANNELS, by D. A. GRAHAM 8vo., Cloth. $3.

The above will be forwarded by express, upon receipt of price. We take especial pains in securing and forwarding any other Works that may be desired, upon receipt of order. All remittances should be made by check, draft, or post office money order.

A. M. CALLENDER & CO., No. 42 Pine Street, New York.

T. C. HOPPER, Pres. G. J. McGOURKEY, Vice-Pres. (New York). WM. N. MILSTED, Gen. Supt. & Treas. (New York). WM. H. DOWN Sec.

AMERICAN METER COMPANY,

WET AND DRY GAS METERS. PRESSURE REGISTERS. METER PROVERS.
STATION METERS. PRESSURE & VACUUM REGISTERS. PORTABLE TEST METERS.
EXHAUSTER GOVERNORS. PRESSURE & VACUUM GAUGES. EXPERIMENTAL METERS.
DRY CENTRE VALVES. CRESSON GAS REGULATORS. AMMONIA TEST METERS.
GOVERNORS FOR GAS WORKS. MARSLAND WATER METERS. BAR AND JET PHOTOMETERS.

Manufactories:
512 W. 22d St., N. Y.
Arch & 22d Sts., Phila.

GAS STOVES,
SUGG'S "STANDARD" ARGAND BURNERS,
SUGG'S ILLUMINATING POWER METER,
Wet Meters, with Lizar's "Invariable Measuring" Drum.

Agencies:
177 Elm Street, Cincinnati.
244 & 246 N. Wells Street, Chicago.
810 North Second Street, St. Louis.
122 & 124 Sutter St., San Francisco.

HELME & McILHENNY,

(Successors to Harris & Brother. Established 1848)

GAS METER MANUFACTURERS,

CONTINUE AS HERETOFORE AT THE OLD ESTABLISHMENT,

Nos. 1115 and 1117 Cherry Street, Philadelphia, Pa.,

To Manufacture Wet and Dry Gas Meters, Station Meters, Experimental Meters, Meter Provers, Center Seals, Pressure Registers,

GOVERNORS, INDICATORS, PHOTOMETERS, & ALL OTHER KINDS OF APPARATUS FOR USE IN GAS WORKS.

From our long practical experience of the business, and from our personal supervision of all work, we can guarantee all orders to be executed promptly, and in every respect satisfactorily.

WM. WALLACE GOODWIN, Prest. and Treas. WM. H. MERRICK, V.-Prest. S. L. JONES, Sec. S. V. MERRICK, Supt.

THE GOODWIN GAS STOVE AND METER COMPANY,

Successors to W. W. GOODWIN & CO.

1012, 1014 and 1016 Filbert St., Phila., Pa. *142 Chambers St., New York.*
76 Dearborn St., Chicago, Ill.

WALDO BROS., Agents, 88 Water St., Boston.

MANUFACTURERS OF THE "SUN DIAL" GAS STOVES, FOR COOKING AND HEATING PURPOSES.

Dry and Wet GAS METERS, Station Meters (Square, Cylindrical or in Staves) Glazed Meters, King's and Sugg's Experimental Meters, Lamp Post Meters, Etc., Etc., Meter Provers (sizes 2, 5 and 10 feet), Pressure Guages of all kinds, Pressure Registers, Pressure and Vacuum Registers, Pressure Indicators (sizes 4 inch, 6 inch and 9 inch), King's Pressure and Vacuum Gauges, Dry and Wet Centre Seals, Dry and Wet Governors, Exhauster Governors, Photometers of all descriptions. Letheby's Sulphur and Ammonia Test Apparatus complete—also Testing and Chemical Apparatus of all kinds, and of the most perfect description, for all purposes relating to Gas.

GOODWIN'S IMPROVED LOWE'S JET PHOTOMETER.

Agents for Brav's Patent Gas Burners and Lanterns.

Special attention to repairs of Meters, and all apparatus connected with the business.
All work guaranteed first class in every particular, and orders filled promptly.

G. B. EDWARDS, Mang'r, New York.
E. H. B. TWINING, Mang'r, Chicago.
A. B. STANNARD, Agent.

D. McDONALD & CO.,

GAS METER MANUFACTURERS.

(Established 1854.)

51 Lancaster St., Albany, N. Y. 34 & 36 West Monroe St., Chicago, Ill.

STATION METERS, EXPERIMENTAL METERS, METER PROVERS, PRESSURE & VACUUM REGISTERS, PRESSURE GAUGES, ETC.

Also STAR GAS STOVES, RANGES, and HEATING STOVES.

We use only the very best materials, and employ the most skilled labor, and by our long experience (29 years) and personal supervision of every detail, we feel justified in assuring the public that our goods will give perfect satisfaction. Every Meter emanating from our establishment will bear the State Inspector's Badge, and will be fully warranted by us. Our Annual and Calendar will be sent to Gas Companies upon application.

KING'S TREATISE ON COAL GAS.

The most complete work on Coal Gas ever published. Three vols., bound, $30.

A. M. CALLENDER & CO., No. 42 Pine Street, New York.

THE GOODWIN GAS STOVE AND METER CO.,

1012-18 Filbert St., Phila., 142 Chambers St., N. Y., 76 Dearborn St., Chicago.

Agents, WALDO BROTHERS, 88 Water Street, Boston.

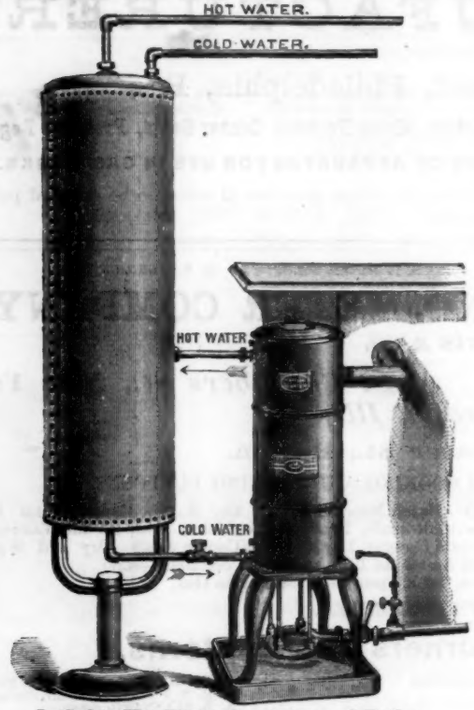
WM. W. GOODWIN, PRES. & TREAS.
W. H. MERRICK, VICE-PRES.
S. LEWIS JONES, SEC.
SAMUEL V. MERRICK, SUPT.

SOLE MANUFACTURERS OF THE

G. B. EDWARDS, Mang'r, N. Y.
E. H. B. TWINING, Mang'r, Chicago.
A. B. STANNARD, Agent.

"SUN DIAL" GAS STOVES

The Most Economical, Efficient, and Durable Gas Stove Made.



I.—Safety Hot Water Generator and Boiler.

II.—Gas Cooking Stove No. 8 B.

Safety Hot Water Generator and Boiler.

Cut I. represents our Safety Gas Hot Water Generator and Boiler, arranged for home use. This most easy, quick, and economical way of preparing a warm bath, or for heating water for any omestic purpose, entirely supersedes any necessity for the use of ranges or stoves—a great comfort, particularly in hot weather. The boiler being self-filling, as the hot water is drawn off, can never become empty, thus preventing the possibility of any accident.

We beg to call attention to the cast iron pan which is now attached to the legs of the Generator (see illustration). This is to catch the drippings from the Coil, which many persons suppose come from a leak, when in fact they are produced by condensation. This condensation is caused by the hot flame coming in contact with the coil filed with cold water.

New Style Gas Cooking Stove.

Cut II. represents our New Style Cooking Stove. As will be seen, it has an ornamented cast iron base and front, and extension shelves. The oven burner, which is atmospheric (unless otherwise ordered), is of an entirely new and improved pattern (patent applied for). The ovens are of greater capacity than those of the old style. The top, in conjunction with the outlet pipe, is designed to carry off all products of combustion; hence the outlet pipe must be connected with a flue, or the stove will not work properly.

This Stove has 4 boiling burners in top of hot plate. All fittings are nickel plated. We are making this style of Cooking Stove in the following sizes—viz., No. 7 B, No. 8 B, No. 9 B, and No. 10 B.

III.—Improved Hot Plate, No. 108.

New Style Hot Plates.

Cut III. represents our New Style of Hot Plates, of which we are making No. 106 (two small boiling burners), No. 107 (two medium sized boiling burners), and No. 108 (two medium and one large boiling burner). See new Catalogue and Price List for further particulars.